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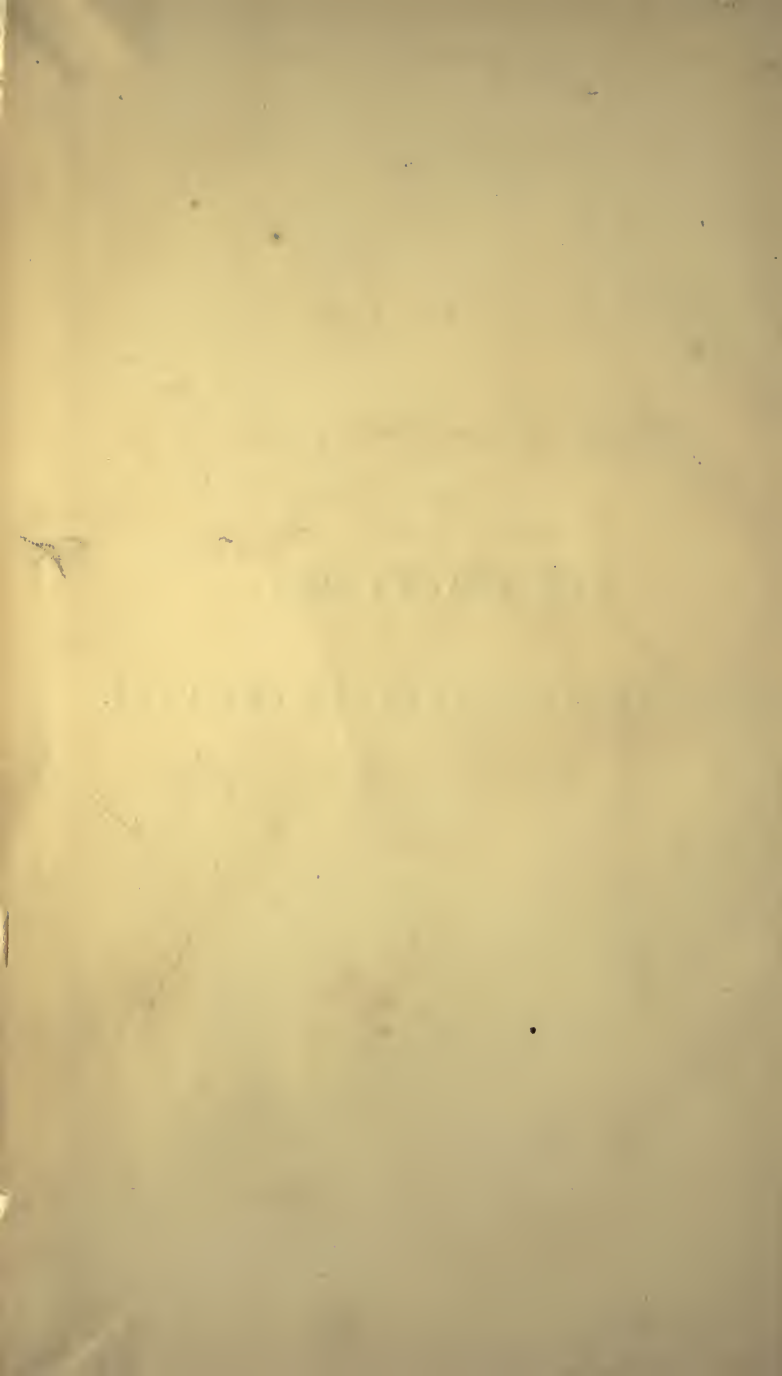


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John Mackenzie
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ON RUPTURE;

ITS CAUSES, MANAGEMENT, AND CURE.



MS. John Mackenzie March 1867
A PRACTICAL TREATISE

RUPTURE;

ITS CAUSES, MANAGEMENT, AND CURE.

AND THE VARIOUS MECHANICAL CONTRIVANCES
EMPLOYED FOR ITS RELIEF.

BY

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ADDRESS.

IN publishing the Second Edition of "A Practical Treatise on Rupture," I desire to record my acknowledgment of the uniform support accorded to me by the medical profession during a period of more than twenty years, by means of which I have acquired great experience in the treatment of "rupture," and have been enabled to effect improvements in the mechanism employed for its support, and thus to alleviate many distressing cases heretofore unrelieved.

The manual is divided into two parts. The former, Chapters 1, 2, and 3, is devoted to general observations on rupture, its causes,

management and cure, and to the preventive measures to be employed when its occurrence is apprehended ; the second part, Chapters 4, 5, and 6, concerns the various remedial appliances adopted when rupture has actually occurred, either as a safeguard against further mischief or in the promotion of a cure. Some of the instruments described do not strictly range under the title given to this manual ; but inasmuch as similar principles are involved in the construction of those found to be the most efficient, I have deemed it not out of place to include a description of them.

The Appendix contains opinions of the medical press and the profession in reference to the instruments recommended.

21, Bull Street, Birmingham, 1865.

PREFACE TO THE SECOND EDITION.

THE rapid sale of the first edition of this manual has rendered it necessary for me to prepare a second one. In doing this I have deemed it desirable to enlarge the work to a considerable extent, feeling that the first edition, however successful and useful it may have been, was too brief in the description of many important facts, and hardly sufficiently comprehensive in its general scope to fully satisfy the natural thirst for information which every intelligent reader, who is the subject of hernia, necessarily feels.

With a view to the increased usefulness of the work, the chapters upon the anatomy and

physiology of the subject have been entirely rewritten and extended; and while it has been my object to enlarge and improve them, I have steadily kept in view the importance of being clear and intelligible, and of not sacrificing lucidity to diffuseness. I am aware how difficult it is for a writer to be both scientific and popular in the treatment of his subject, and am not vain enough to assume that I have succeeded in overcoming the difficulty in this instance; but assert, without hesitation, that I have conscientiously and zealously endeavoured to attain to this end, and earnestly hope the reader's opinion may favourably regard the result of my efforts. To have treated the subject in a more technical manner would have been to render it distasteful and perhaps useless; to have gone to the other extreme would have been, I believe, equally so. My object has not been to attempt to write a book for professional readers, but rather to pen such a treatise as shall

satisfy the mind of the earnest and intelligent non-professional inquirer.

Neither have I the slightest intention of making the attempt to stand between the surgeon and his patient in cases of the kind treated of here, for that would be both presumption and dishonesty. I have endeavoured only to write what shall prove a guide to the ruptured in the choice of an instrument for the support and relief of their hernia, and instruction to those who are not ruptured, in order that they may be prevented from becoming so, which latter object is apt to have its importance overlooked. The development of preventive medicine and surgery is, however, rapidly on the increase, both reflection and experience showing how much safer, shorter, and more agreeable prevention is than cure, many cases indeed admitting of prevention, and not at all admitting of cure, but only of palliation. This is particularly true of many, perhaps of the majority of cases of

hernia; and yet it will be seen how very little the principle is regarded, great numbers of persons suffering from actual rupture who, by a better knowledge of the laws of their own health, such as every one ought to possess, might have escaped the infliction of which they complain. There is, undoubtedly, an increased and increasing knowledge of the laws of health, or, as it is sometimes called, of popular physiology; but at present that knowledge is confined to the few; its possession is the exception rather than the rule; and it can scarcely be otherwise until physiology shall be a subject introduced into the course of every individual's education. If it be necessary to learn to read, write, and cipher, to draw, to dance, and to step with conventional propriety into or out of a carriage, how much more important is it to acquire a knowledge which will enable us to preserve our health, without which these accomplishments may be rendered altogether useless, or

at least have their usefulness cribbed and curtailed? But unfortunately, instead of popular physiology being part of the educational curriculum, it is most frequently entirely ignored both in theory and in practice, and man is treated as if he were the only animated being who was not called upon to submit to natural law. There is no place in which this violation of the laws of health is so generally witnessed as in boarding-schools, the very establishments of all others where Nature's dictates ought to be the most carefully listened to and obeyed. It is particularly the case in boarding-schools for girls, where everything is made subordinate to fashionable external propriety of deportment, where to run or to romp is considered unladylike, where to be natural and to obey that instinct which prompts all young creatures to activity is considered tomboyish and improper. It is considered, however, in these very fashionable establishments quite proper to keep a delicate girl sitting for hours

on a wooden form without any support to her back ; it is thought to be quite sufficient for the purposes of bodily health that a formal walk in procession should be taken once a-day, provided it be fine ; and so, while everything is done to educate the mind and to form the manners, nothing or next to nothing is done to strengthen the muscles, to knit the joints, to consolidate the bones, and to brace the nerves. Can it be a matter of surprise that the weakened muscles, unused as they are, unstimulated by healthy nervous force as they are, unsupplied by a dancing current of pure blood as they are, and which they can only obtain by natural unrestrained exercise, should give way, producing in one case spinal curvature, and in another weak joints and physical evils of the most serious character ? Can we be reasonably surprised if all or any of the muscles, including those engaged in closing the hernial openings, fail to perform their natural duties, and thus allow the body to

fall into disease, whether internal or external, medical or surgical? We cannot compare with these unhappy girls, of whose sufferings I have been so frequently a witness, their own brothers at the public schools, where cricket, boating, and other athletic sports occupy the time not devoted to study. Originally they possessed similar constitutions, and were both equally capable of becoming physically strong; yet what a difference is frequently observed between the grown-up sister and the grown-up brother. While the one is weakly, nervous, and deformed, the other is a model of physical development and rude health; while the one is feeble and scarcely competent to enjoy life, rather existing than living, the other is mentally and physically strong, in whom every appetite is a pleasure, as it ought to be, who is capable of being useful by turning his powers to practical account, and differs from the first by possessing that inestimable blessing, a "*mens sana in*

and the general health may be improved by tonics, bathing, and anything that tends to promote the general tone of the system; but these measures, as far as they extend, must be employed only under the personal superintendence and direction of a duly qualified and experienced surgeon, and cannot effectively be indicated in books, or sufficiently pointed out by me; and even if they could, it would be highly injudicious for any person to undertake the treatment of his own case.

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corpore sano.” That every educated person can acquire such a knowledge of the laws of health as may not only make him a “physician at forty,” but make him also able so to shape his course from very early life that he shall be able materially to add to his happiness and prolong his life, is clear from the very excellent popular works which have during the last twenty years been produced by such men as Southwood Smith, Andrew Combe, Johnson, Wilson, and others; but though teachers have been both numerous and competent, pupils have been wanting who were willing to learn the valuable lessons these teachers desired to impart. It certainly is quite true that enough physiology was comprehended to guide instructors from the folly of insisting on sedentary habits, and at the same time of overtasking the unequal brain. Till these simple facts shall become generally recognised, appreciated, and acted upon, certainly no improvement in general physical

health can reasonably be expected or obtained. I have been induced to make these remarks owing to the very important connexion between spinal curvature, hernia, rickets, and other diseases, which have during the last twenty years come under my notice, where mechanical support has been required. It is my particular province to apply means of alleviating, happily in some cases of curing, these maladies; but if I could, by a seasonable word of advice and caution, be humbly instrumental in conducing to their prevention, it would be to me a source of the most true and unbounded satisfaction.

I have not considered it necessary, in the following pages, to enter upon the question of the medical treatment of hernia. In reality very *little* can be done, either for its prevention or relief, by strictly medical means; it is true, *something* may be done. The bowels may be prevented from becoming constipated, thus avoiding undue straining from that cause,

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PRACTICAL TREATISE ON RUPTURE.

CHAPTER I.

General observations—Definition of a rupture—Description of the abdominal cavity—Its boundaries—Its contents—Its lining membrane, the peritoneum—Functions and disposition of the peritoneum—Description of the abdominal organs—The liver—The stomach—The spleen—The pancreas—The intestines—Description of the abdominal walls—The umbilicus or navel—The inguinal canal—The crural canal—Occasional passages for rupture—Definition of the term “rupture”—Return of a rupture by the “taxis”—Various stages of hernia: reducible; irreducible; strangulated—Danger of the latter form—Importance of early attention—Signs of rupture—External swelling not an invariable accompaniment.

DURING an experience of more than twenty years, I have frequently noticed how little the nature of rupture is understood by the generality of non-professional persons, and how constantly its occurrence and continued presence is unobserved even by the patient him-

self. It is not surprising that this should be so in the case of young children, but even adults who are ignorant or unobservant frequently also fail to discern the true nature of their ailment, and only learn the unwelcome truth when the urgency of their symptoms has at length compelled them to seek surgical relief; this step is, however, too often postponed until the patient's condition has become intolerable, and life itself has been placed in jeopardy. But this procrastination arises not only from ignorance; it very often is the result of an innate delicacy, almost morbidly extreme in some persons, which causes them to endure a large amount of inconvenience rather than apply to a surgeon for assistance.

Whatever be the cause of neglect, however, signifies but little, such neglect cannot be too strongly condemned. Its consequences are unnecessary suffering, continual danger to life, and the complication of what was originally a simple and easily relieved condition. The patient, by such a course, not only exposes himself to peril of the most extreme kind, but he, at the same time, does all he can to over-tax the resources of the surgeon and the skill

of the mechanician ; he adopts a course which places himself, and those who would assist him, at the greatest possible disadvantage, and not even indirectly does he, himself, derive the smallest advantage from it. Need more be said to induce the ruptured to seek immediate assistance? Surely not ; but if iteration and reiteration were necessary to command attention, I feel so strongly the importance of it, that I, for one, should never tire of impressing upon the subjects of Rupture the advice above given.

Having said so much, in general terms, respecting rupture, and the importance of its early treatment, let us at once proceed to inquire what is meant by "rupture." The common meaning of the term rupture is an escape from the cavity of the abdomen or belly of a portion of its contents ; before this question, however, can be fully understood, it will be necessary to learn what the abdomen is, and what its contents are.

The abdomen is the cavity which occupies the lower half of the trunk of the body, the chest occupying the upper half. It may be conveniently described as having a roof, a

floor, a front and a back wall, and two sides. The roof of the abdomen is a somewhat horizontal muscular layer, which is, at the same time, the floor of the chest and the roof of the abdomen. It is a respiratory muscle ; that is to say, it is one of the instruments concerned in the important function of breathing, and, in such capacity, rising and falling as it alternately does, and this continually, and exerting pressure on the contents of the abdomen, it has a closer connexion with our subject than would, at first sight, appear to be the case.

The floor of the abdomen consists of the bony structures, of which the hip bones form a part, and which is called the pelvis, from its basin-like form, and of certain muscles which close the openings between the bones, and contribute to the support of the abdominal organs.

The back wall of the abdomen is formed by the spinal column and the muscles lying upon it, whilst the front and side walls, which, from their common character, may be taken together, consist of the lower ribs and of certain large flat muscles which extend from the chest

and ribs above to the pelvis below, almost, *but not quite*, perfectly closing the abdominal cavity.

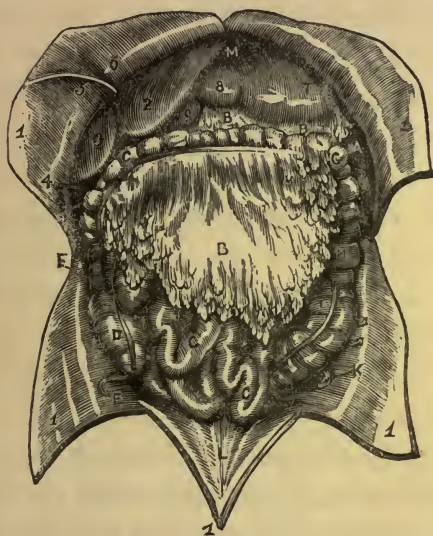
Lining this cavity is found a thin, smooth membrane called the peritoneum (from *περι-τείνω*, to extend around). This membrane not only lines the walls of the abdomen, but it is reflected or bent over each organ contained in it, and the membrane being a shut sac, like a nearly empty bladder with its neck tied, the organs over which it is reflected are allowed a considerable degree of motion, and are really *outside* of it, although completely surrounded by it, just in the same manner as the head is surrounded by a double nightcap and is yet *outside* it; that is, not in the cavity of the nightcap. What then, it will be asked, is inside the membrane? Why, very little, but that little is sufficient to render it the useful instrument it is; it contains a small quantity of serous liquid acting as a lubricator, and allowing the two surfaces of the membrane to glide over each other without friction, and with the most perfect freedom.

The organs which the cavity of the abdomen contains are principally the liver, the stomach,

the spleen, the pancreas, the large and small intestines, and the bladder; and, as has been already mentioned, these are more or less completely surrounded by the folds of the peritoneum. One of these folds is so remarkable, and is so intimately connected with the subject of rupture, that I must, before describing the organs themselves, say a few words in reference to it.

It is a large double fold of the peritoneum, which hangs down from the stomach precisely like a large apron, extending as low as the groins, covering and floating upon nearly the whole of the intestines, serving at once to protect them and to facilitate the movements of which they are continually the seat. This apron-like fold of membrane is technically called "omentum," and is the depository of much fat, which, in stout people, is increased to a very large and inconvenient quantity, and contributes greatly to the corpulency of obese persons. The contents of the abdomen will be better comprehended by reference to the annexed illustrations (Diagrams Nos. 1 and 2), taken from Erasmus Wilson's "Anatomist's Vade Mecum."

Diagram No. 1.

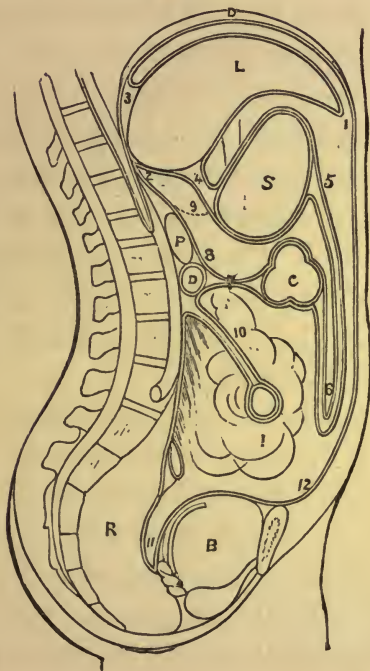


1 1. The flaps of the abdominal parietes turned aside. 2. The liver, its left lobe. 3. Its right lobe. 4. The fundus of the gall bladder. 5. The round ligament of the liver, issuing from the cleft of the longitudinal fissure, and passing round the parietes of the abdomen to the umbilicus. 6. Part of the broad ligament of the liver. 7. The stomach. 8. Its pyloric end. 9. The commencement of the duodenum. A. The lower extremity of the spleen. B B. The greater omentum. C C. The small intestines. D. The cæcum. E. The appendix cæci. F. The ascending colon. G G. The transverse colon. H. The descending colon. I. The sigmoid flexure of the colon. K. Appendices epiploicæ connected with the sigmoid flexure. L. Three ridges, representing the cords of the urachus and hypogastric arteries ascending to the umbilicus. M. Part of the under surface of the diaphragm.

Any description of the organs contained in the abdomen would be altogether superfluous if they had no connexion with the subject of hernia; but hernia being the escape of an organ or part of one from its containing cavity, it is manifestly impossible for the reader to understand what a hernia may consist of, unless he knows what the cavity naturally contains. I shall, therefore, very briefly describe the position and character of the abdominal organs.

At the upper surface of the abdominal cavity, immediately below, and in contact with the diaphragm, sheltered by the ribs of the right side, below the borders of which it shortly reaches, and extending across to the left side, is the liver, the largest organ of the body, whose function it is to secrete the bile. It is soft, but compact in texture, and is, in a diseased state, subject to enlargement, then extending, in some cases, down to the right groin. In such cases, its natural weight of about three and a half pounds may be increased to upwards of twelve pounds. It will be readily understood how such an enlarged condition of the organ might act, by

Diagram No. 2.



D. The diaphragm. S. The stomach. C. The transverse colon. D. The transverse duodenum. P. The pancreas. I. The small intestines. R. The rectum. B. The urinary bladder. 1. The anterior layer of the peritoneum, lining the under surface of the diaphragm. 2. The posterior layer. 3. The coronary ligament, formed by the passage of these two layers to the posterior border of the liver. 4. The lesser omentum; the two layers passing from the under surface of the liver to the lesser curve of the stomach. 5. The two layers meeting at the greater curve, then passing downwards and returning upon themselves, forming (6) the greater omentum. 7. The transverse meso-colon. 8. The posterior layer traced upwards in front of D, the transverse duodenum, and P, the pancreas, to become continuous with the posterior layer (2). 9. The foramen of Winslow; the dotted line bounding this foramen inferiorly, marks the course of the hepatic artery forwards, to enter between the layers of the lesser omentum. 10. The mesentery encircling the small intestine. 11. The recto-vesical fold, formed by the descending anterior layer. 12. The anterior layer traced upwards upon the internal surface of the abdominal parietes to the layer (1) with which the examination commenced.

10 THE STOMACH, SPLEEN, AND PANCREAS.

its bulk and pressure, in favouring the production of hernia, and even itself become extended in part from its natural cavity.

The stomach also occupies the upper part of the abdomen, but is situated principally on the left side, and is overlapped in part by the liver.

Lying in contact with its left, or larger extremity, is the spleen, an organ whose nature and functions, physiology, despite the immense progress it has of late years made, is utterly incompetent to explain.

The pancreas, or sweetbread, lies immediately below and in contact with the under surface of the stomach. Its left extremity nearly touches the spleen, while its right is in contact with the termination of the stomach, and commencement of the small intestines.

In reference to the subject of hernia, however, all the organs of the abdomen yield in importance to the intestines. Although all the abdominal organs have been known to protrude, yet it is more frequently the case that the small intestines, that portion of the large intestine called the colon, and the omentum already described, are the parts most liable to the accident.

The intestines are a long tube which forms a

continuation of the stomach, and is invested, like the other abdominal organs, but more completely than they, by the peritoneum, which acts as a medium of support by which the intestines are loosely held; suspended, in a manner, to the spinal column. The intestinal tube is about twenty-five feet in length, of which the first four-fifths are narrow, and are therefore called "small intestines;" the remaining fifth is larger, and is designated in consequence the "large intestine." This narrow and long tube is enabled to occupy the comparatively limited extent of the abdomen below the previously described organs, by virtue of its numerous convolutions and turnings, which allow of its being "packed" in the most economical manner as regards space.

From the great extent, form, situation, and disposition of the intestines, it will be readily understood, after I shall have described the hernial openings, that they, together with the apron-like omentum which covers them, are the most prone, of all the abdominal organs, to become the subjects of displacement and protrusion.

The bladder occupies the lowest part of the abdomen, or the hollow formed by the bones

12 THE ABDOMINAL WALLS AND UMBILICUS.

of the pelvis, being almost entirely concealed and protected by them, and covered only at the top by the peritoneum.

In order to make perfectly clear and intelligible the nature of a rupture, I must now specially describe those parts of the abdominal walls which assist, by their peculiar conformation, in the production of it. I have already said that the lateral and front walls of the abdomen consist of flat muscles, which almost, but *not quite*, perfectly close the abdominal cavity. It is this qualification which demands our attention, as it is this very want of completeness in the closure that literally *opens the door* in most instances to the occurrence of rupture.

The umbilicus, more commonly known as the navel, is one of the points which is particularly liable to give way from this incompleteness, and the accident happens in the infantine periods of life, because at these periods the part has not properly consolidated, and the crying and other muscular efforts of the infant cause a greater pressure than the yet tender point is able to sustain. The result is a disruption of the sides of the opening and an umbilical hernia, which, as a rule, contains omentum only.

This peculiar form of hernia may occur before birth, and is then, of course, the result of naturally imperfect conformation, and is purely an accident beyond all control. It may contain either bowel, omentum, or even liver or spleen. Such cases are happily very rare, but should they come under surgical treatment, they must receive the same kind of aid as is required by the other variety.

At the lower and lateral parts of the abdomen, called the groins, are other weak points, naturally two each side, one above the other, through which it is *very common* for hernia to occur. The upper opening is known as the "inguinal canal," and naturally gives lodgment to certain parts of considerable importance, but the nature of which it is unnecessary to our purpose to explain. Below this opening is another which gives passage to a large artery and vein from the abdomen to the thigh, and through this opening a portion of intestine or omentum, or both, may be, and frequently is forced, appearing below the point of inguinal hernia, upon the upper part of the thigh, and called in consequence "crural hernia."

There are many other forms of protrusion of the abdominal contents; they may be

forced, for instance, upwards, through the diaphragm or roof into the cavity of the chest; downwards, through an opening which gives passage to an opening in the floor; and directly forward, through any part of the front wall of the abdomen; but as all the kinds of hernia except inguinal, crural, and umbilical are rare and exceptional, and as my object is not to write an exhaustive treatise on rupture, but merely to compose such a guide as shall be practically of service to the ruptured, it would be a work of supererogation to occupy the reader with a full description of them. They are, of course, highly interesting from a professional point of view, and thus offer a temptation to description, but as they very seldom occur, their natural history must be omitted from this brochure. Scrotal hernia and congenital hernia are terms often met with, but the affections are only slight varieties of common inguinal hernia, and in a popular treatise require no special description, as in treatment they require no special surgical appliance for their relief.

By the word "rupture" or "hernia," I mean to convey the idea of an escape of a portion of the contents of the abdomen, which

portion may consist of bowel alone, of omentum alone, or of both together. In the general acceptation of the word "hernia," any protrusion of part of an organ from its containing cavity is meant—as "hernia of the brain," "hernia of the eye," "hernia of the windpipe," &c.—but it must be understood that the meaning of the term, as used in this work, strictly applies to protrusion of parts from the cavity of the abdomen or "belly."

The term "rupture" is, in most cases, an incorrect one; it conveys the notion that certain parts are "broken through" or forcibly disconnected, whereas it is, as a rule, the mere enlargement of a natural opening or passage. The exceptions of most general occurrence are "direct" inguinal hernia, and umbilical hernia in adults. Take, for example, the case of common rupture in the groin; there exists, as already stated, a natural canal, which has for its object the lodgment of certain parts which are naturally intended to occupy it. This canal, the internal and external termination of which is called a "ring," is formed by an opening left in the several muscles and other coverings, which together constitute the walls or parietes of the cavity of the abdomen.

Under ordinary circumstances, the canal and its boundaries remain in their natural condition, but under certain extraordinary and exceptional ones, they may be distended, and made to admit what they are not naturally intended to contain,—viz., portions of the contents of the abdomen. As soon as this transfer of bowel, or of the omentum which covers the bowel, has taken place, an accident has happened—a displacement of an organ has occurred—and though no actual “breakage” or tearing of parts has, as a rule, been effected, yet there is a dilatation of a natural canal, a dislocation of an organ, and a pushing before it of its natural coverings, and, in common parlance, there is a “rupture.”

The protruded portion, though rarely large at first, may, if no mechanical means are adopted to prevent it, increase in size to an enormous extent. I have seen several cases in which its weight was as much as ten or twelve pounds.

In the earlier stages of the malady, the rupture may be returnable into the abdomen by the assumption of the recumbent position, and by the application of what is technically termed the “taxis” (touch, or handling), a

mechanical operation or manipulation hereafter to be described. It is the returning, by the pressure of the hand or fingers, of the protrusion into the cavity of the abdomen, and may be so simple as to be effected by the patient himself, while in the erect position; in worse cases it will be necessary, and in all cases better, to assume the recumbent posture, bending the thigh upon the abdomen at the same time, so as to relax every muscle and tendon which, by its contraction, could prevent the return of the tumour, which should then be gradually "kneaded," as it were, into its natural cavity. Where the patient is unable to successfully employ the taxis, he should at once call in an experienced surgeon, whose knowledge of the anatomy of the parts is necessary to attain the object in view, and who will be careful not to employ greater force than the delicate organs implicated will safely bear, and who will, in addition, be able to employ whatever other measures may be required to restore the displaced parts to their natural situation. In some cases it may be necessary to give chloroform, to draw blood, to use the hot bath, to apply cold locally, to ad-

minister opium, and adopt other means, either singly or in conjunction, and lastly, if all these fail, to resort at the proper time to the only remaining measure—the *dernier ressort*—the much-dreaded operation. There is, however, very little danger of this last means being necessary, except in cases where patients have neglected themselves and have lost time; hence the importance of not dallying with the danger, but at once of applying to the surgeon the moment it is found that the patient's own simple attempts have failed to return the protruded organ.

It is possible, however, by *neglect*, to bring the parts into such a state of distension, inflammation, &c., that the extruded parts cannot be returned into the abdomen. This condition is termed "Irreducible" hernia, in contradistinction to that kind which is readily returned, and which is called "Reducible." The moment the irreducible form is established, the risk of most serious consequences is incurred. For instance, the accident called Strangulation may happen, which is one fraught with great pain and danger, and only to be relieved by operative measures. I will endeavour to describe a

strangulated portion of bowel, and first, let us bear in mind that the intestine contains solid, liquid, and gaseous matters, and that in its walls or parietes are numberless blood-vessels. It will be readily understood that a knuckle or bend of intestine, having escaped from the cavity of the abdomen, and having also become adherent to its coverings, may have such a large quantity of contained matter passed into it as shall distend it, obstruct it, and obstruct or strangulate it; and this may occur with or without swelling of the neck of the sac (investing peritoneum), or spasm of the muscular fibres which surround the sac. Under the conditions described, the bowels are mechanically obstructed, and if the obstruction be not speedily relieved, death must be the not far distant result; but besides the obstruction to the contents of the bowels, there is also obstruction to the circulation of the vessels situated in the wall of the intestine, which is soon followed by fatal congestion, inflammation, and mortification of the entangled bowel. I have no wish, in making these observations, to excite unnecessary alarm, but only to clearly show and emphatically impress the paramount

importance of early attention to hernia, in order to prevent its becoming irreducible, and to render the contingent conditions above described impossible; for in describing what must inevitably take place in a strangulated portion of bowel, I have not in the slightest degree exaggerated the danger of the result; nor is the accident an uncommon one, and, what is of more importance still, is the circumstance that operations for strangulated hernia are very fatal, however skilfully performed, and in this fact we find another inducement to adopt the preventive plan and support the hernia in its proper position, so as to render impossible its becoming irreducible or strangulated.

For the better understanding of the above remarks, I have introduced the following figures, taken from Bernard and Huett's Operative Surgery, illustrative of the progressive stages of hernia from its first occurrence to the state of strangulation.

“The figures represent a section involving one of the abdominal openings, and the intestines in the different stages through which they pass in the formation of a hernial protrusion.



DIAGRAM N° III
Shewing the progressive developement of Rupture

FIG 1.



FIG. 2



FIG 3



FIG. 4



FIG. 5



FIG. 6

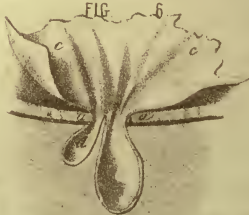


FIG. 7



FIG 8.



Fig. 1. A. Abdominal opening. B B B. A mass of intestines forcing the peritoneum, C C C, before it, and having a tendency to enter the opening A. This is the first stage of the formation of the hernial sac.

Fig. 2. The intestine B B B, and the peritoneum C, have passed through the opening A A. The process is in a more advanced state than in figure 1, but the sac C is not as yet contracted at the opening; its *neck* is not formed.

Fig. 3. B B B. A loop of *protruded* intestine, inclosed in the *peritoneal* sac C; the sac is dilated into the shape of a bottle, C, and constricted on a level with the opening, A A. This constricted portion of the sac is called its "*neck*."

Fig. 4. Formation of the sac by the peritoneum. The walls of the sac D are considerably thickened in the neighbourhood of the opening A A; C C C the body of the sac.

Fig. 5. Sometimes the sacs are multiplied and lie one upon the other E and D. When the sac is forced downward, and its neck fairly formed, a second sac with an equally well marked neck may also be formed in addition to the first; C, the peritoneum of the hernial sac which is much thickened, especially at the constricted points.

Fig. 6. When the first neck does not become completely detached from the abdominal opening A A, a second sac, D, may occasionally be formed beside the first.

Fig. 7. A loop of intestine, B, strangulated in the abdominal opening A A.

Fig. 8. A *portion* of the intestine alone strangulated in the abdominal opening A A.

With the aid of the foregoing illustrations it is hoped that the nature and danger of strangulated hernia will be thoroughly understood.

There is an error prevalent that a rupture is always indicated by an external, readily visible tumour; this is, however, not necessarily the case, for if it be of recent occurrence, and if the amount of force which caused it be slight in proportion to the strength of the abdominal wall, the bowel or omentum may not descend through the entire length of the canal, but only through a part of its course, thus remaining in the canal, and being covered by muscle as well as skin. This thicker covering renders the displacement less palpable, so that to an unobservant or unprofessional eye nothing remarkable may appear to have happened, no departure from the healthy condition of the parts being observed, although a sensation of uneasiness is felt. This state of things may be considered as the first and most simple stage of the affection, and that in which the most satisfactory results may be obtained by mechanical treatment. It is not at all uncommon for cases in this incipient stage to be radically and permanently cured without any surgical operation or even serious inconvenience.

CHAPTER II.

The three common forms of rupture—Inguinal rupture—Femoral rupture—Umbilical or navel rupture—Great frequency of rupture—Inguinal rupture the most common form of the malady—Single hernia—Double hernia—Causes of rupture—Predisposing causes—Exciting causes—Tight-lacing—Partial ruptures—Radical cure of rupture—Probabilities of it—Conditions unfavourable to it—Early attention indispensable.

For all practical purposes, we may consider three principal forms of rupture, viz. :—

I. *Inguinal Rupture*, a protrusion of some portion of the contents of the abdomen through the inguinal canal in the groin; this is by far the most common form of hernia. What is called “Scrotal” hernia is the same displacement which has proceeded further, and descended into the scrotum, and is therefore only an aggravated or advanced state of common inguinal hernia, from which it differs essentially in no way, and requires, therefore, precisely the same kind of treatment.

The variety of hernia called "Congenital" is also merely that form of the inguinal which occurs before or at birth; and has also the trifling difference of receiving its peritoneal covering in a slightly different manner: in all *essential* respects it is inguinal hernia. This variety should be treated very early; its causes are, imperfect closure of the hernial ring, or excessive pressure during labour; these cases may be almost invariably *cured* by mechanical agency when recourse is had to it sufficiently early.

Ruptures occurring in children shortly after birth are very frequently mistaken for congenital. The practice of bandaging and swathing young infants is a common cause of the accident. In the natural and uncompressed state of the muscles of the abdomen, the actions of crying, struggling, &c., will stretch the muscles and other parts which have sufficient contractile power to bear the pressure without injury, but when expansion is checked by artificial compression, the muscular effort presses the bowel downwards with unnatural force upon the yet tender tissues of the rings, producing one of the varieties of rupture.

II. *Femoral Hernia*, is a similar protrusion of the abdominal contents through an opening just below the groin, or at the upper part of the thigh, and, though not absolutely or exclusively confined to women, it is nevertheless most common to them, and particularly after child-birth.

Femoral rupture is sometimes mistaken for enlarged glands, and *vice versá*. There are several glands in the vicinity of the femoral ring, and to exert pressure on these when enlarged and inflamed would cause much pain and mischief. To the eye of a medical man there is an immense difference between the two cases, but not necessarily so to that of an unprofessional person; and this fact shows the importance of consulting a competent authority whenever the body shall have become the seat of either medical or surgical disease.

III. *Umbilical or Navel Rupture* is that in which the protrusion takes place at the "umbilicus" or navel. After inguinal and femoral hernia this is the most common form. It may be congenital, it may occur during early infant life, and it may occur at adult age. In congenital cases, the tumour is always *at* and

through the umbilical opening or navel. Its coverings are few and thin, and it often contains a part of that proportionably large organ of infant life, the liver. This variety of umbilical hernia presents no features of danger, and may be always cured by the timely application of suitable means, the nature of which I shall explain in a subsequent chapter.

Navel ruptures in infants differ from the congenital form only in the causes which produce them, and the age at which they occur, their management and mode of cure being precisely identical in both cases.

Navel ruptures in adults differ from those occurring in infants inasmuch as, that in the former they are usually above, below, or on one side of the navel, whilst in the latter they take place directly through it. The reason of this is easily understood: in the infant the part is unconsolidated and weak, but after consolidation has once taken place, the umbilicus becomes the strongest part of the abdominal wall, and therefore the last which would be broken through by any force brought to bear upon it. Hence, children's umbilical herniæ are always circular, whilst those of

adults take the form of the opening they have made for themselves. Should an adult umbilical hernia be found to have protruded *through* the ring, it is probable that the hernia may have existed (although unrecognised) from the time of infancy.

Among adults, women are much more liable to this form of hernia than men, for reasons which will readily occur to the mind of the reader.

With regard to the frequency of rupture, it is something so remarkable, that to any one whose attention has not been directed to the subject, it is scarcely credible. It has, however, been only too well established by undeniable testimony. What is the frequency of this accident? and what the authority for the published statistics? It has been ascertained by means of an examination of large numbers of men who have been drafted into Her Majesty's service, and by consulting other sources of information equally to be depended upon, *that twelve and a half per cent. of the whole population are the subjects of rupture*; this is the same thing as saying that one in every eight suffers from it; this is really an

astounding fact, and invests the subject with an eminent degree of interest and importance.

By far the greater number of these cases are those of inguinal hernia: some "single," or only on one side; some, the smaller number, "double," or on both sides of the body. This form of hernia, therefore, will be seen to be that which possesses the greatest claim to our notice.

Having briefly referred to the nature, locality, and frequency of the affection, we are naturally led to inquire into its cause; and this inquiry is not a mere matter of curiosity, because upon such knowledge must necessarily be based those precautionary measures which have for their object the prevention of the lesion. The causes may be conveniently divided into two classes—viz.: Predisposing causes and Exciting causes. By the term predisposing cause is meant any circumstance which renders the body liable to take on actual disease, by making it more susceptible; it is hardly correct to class predisposition as a cause of disease; it should rather be considered a condition of body favourable to the action of the true or exciting cause, as it is called.

Custom, however, and perhaps convenience, have decided to accept the term, and it is not for me to urge too much against it; nor, indeed, does the term much signify, provided we are agreed what meaning to attach to it.

By the term exciting cause is meant that action which immediately produces the complaint, or at once *excites* it, and it may act either in consequence or independently of a predisposing cause.

A common predisposing cause of rupture is general constitutional debility, however induced, whether by a hot climate, previous illness, hereditary weakness, or any kind of excess or debilitating influence. For by the operation of any of these causes, the muscles sympathize with the generally weak condition of the whole body, they become relaxed, unstrung, and those of the abdominal walls and apertures yield to pressure, by which the canal itself is widened; and those parts which before supported the pressure of the abdominal contents, having lost their tone, yield readily to any unusual pressure, and so are favourable to the production of rupture, which will occur

whenever the true or exciting cause shall come into action.

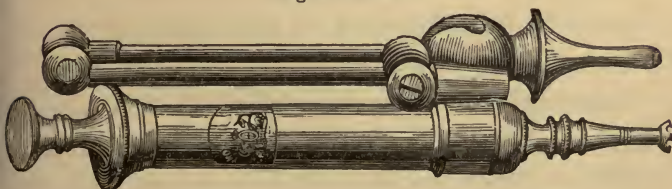
There may, however, be a want of tone locally, that is, in the hernial region only, and in such cases hernia would be as readily produced by an exciting cause as though the relaxation were general.

The *exciting* causes of rupture are comprehended under the general term, *violent exertion*; such, for example, as carrying heavy weights, jumping, running, rowing, hunting, violent coughing, the act of vomiting, and straining of any kind—even sneezing has been known to produce it. All these actions, &c. operate by pressing down the abdominal contents with great and sudden force, by which the partially-closed openings or “rings” become somewhat enlarged, and permit the muscular pressure to force through them what ought to remain in the cavity, and thus the rupture is produced. Under similar circumstances the yet tender tissues which close the umbilical or navel aperture may give way and produce a navel rupture. Among the exciting causes of rupture I may be allowed to mention specially the efforts consequent upon a consti-

pated condition of the bowels, due attention to which is a matter of great moment both to health and comfort. The continued use of purgatives is sure to prove injurious, and the effective and safe action of lavements or injections is pretty generally admitted, so that they require no advocacy here. They are more particularly useful in cases where, in addition to the constipation, rupture already exists or is likely to occur. A warm water injection in these cases will be found simple, effective, and safe.

A properly constructed apparatus being very desirable, I append a woodcut of a very convenient instrument of my own invention, Diagram No. 4, which, as the subjoined testimonials will show, has received very high commendation from the medical press.

Diagram No. 4.



It is constructed without any detached parts, so that there is no chance of the instrument

being rendered useless by the loss or destruction of any of its pieces; it is also very slightly liable to get out of order. Its action is readily understood: the pipe being carefully introduced, the foot of the pump is placed in a basin containing the water or other fluid intended for injection, and the handle worked until a sufficient quantity has been introduced. This instrument is called the "Portable Jointed Enema Apparatus" from the manner of its folding.

TESTIMONIALS.

"An ingenious and beautifully constructed machine."—*Lancet*, Jan. 4, 1845.

"The manufacture is of a superior order, and in our opinion it is the safest and simplest form of enema apparatus now in use."—*Medical Times*, March 15, 1845.

The occurrence of rupture is frequently favoured, if not caused by a custom which must be reprobated by all reflecting persons: I mean that of wearing tight belts round the abdomen. The popular notion is that they afford support, and thus exert a beneficial action; this, however, like very many other popular notions, is also a popular error. They press unduly on parts which ought to have free

action and hamper the healthy action of the muscles, and also assist in pressing down the abdominal contents to the lower part of the abdomen, where are situated those very weak points which play so important a part in the history of ordinary rupture. There is no doubt that many persons owe their ruptures to this practice, which they have followed with the mistaken idea that they were adopting a means of preventing them.

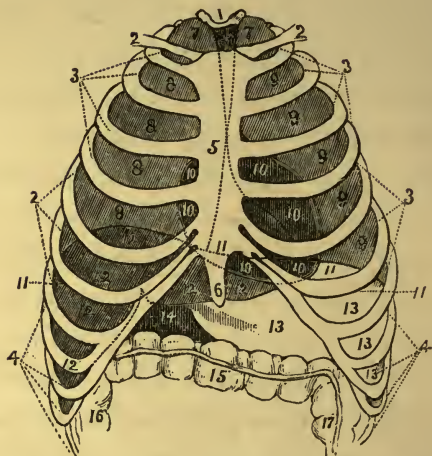
Another injurious practice of the same kind, which produces many cases of infantile hernia, is that of very tightly swathing and bandaging infants. Women, also, like men and infants, must perpetrate another form of the same folly; they, perhaps, and probably unwittingly, adopt another means of producing rupture by wearing stays laced to an extreme degree of tightness; by this observance of a fashion which has had too much sway, but which now is happily declining, not only are the organs of the chest compressed and even dislocated, giving rise to various symptoms of a very serious character, which I need not here enter upon, but the organs of the abdomen are also pressed downwards, and effects produced simi-

lar to those which have been described as the result of ordinary tight bandaging. When women shall learn that tight-lacing is neither necessary nor an improvement to their figures, a diminution in the number of cases of hernia and a general improvement in their health will be observed. Tight-lacing is one of those pernicious customs which will be abandoned by its votaries only when popular physiology shall have taught that it is neither a benefit nor an improvement to the appearance, but is, on the other hand, positively injurious. One cannot help wondering that unassisted common sense has not suggested the thought that man cannot improve a figure which came eminently beautiful from the hand of God. What would be thought of a suggestion to modify the ideal form of a Roman or Grecian statue of the female figure in such a manner as would be effected by the use of stays? Could anything be imagined more suggestive of the ridiculous than a Venus in stays? I believe, however, that a more sensible tone of feeling with regard to dress is beginning to prevail, and that a time is coming when the folly of rendering the beautiful mechanism of the body partially

useless and crippled shall no longer exist. The following remarks by Mr. Erasmus Wilson, in his excellent work on healthy skin, are so appropriate and well put that I shall take the liberty of quoting them:—

“Stays, before womanhood, are instruments of barbarity and torture, and then they are needed only to give beauty to the chest. It is the duty of every mother and every guardian of children to inquire the purpose for which stays were introduced into female attire. Was it for warmth? If so, they certainly fulfil the intention very badly and are much inferior to an elastic woollen habit, or one of silk quilted with wool. Was it to force the ribs, while yet soft and pliant, into the place of the liver and stomach, and the two latter into the space allotted for other parts? to engender disease and deformity to the sufferer and her children for generations? Truly, if this were the object, the device is most successful, and the intention most ingeniously fulfilled. But few, I think, will believe that this is really the purpose which mothers and guardians have in view in confining their little victims in stays, whatever the result may be.”

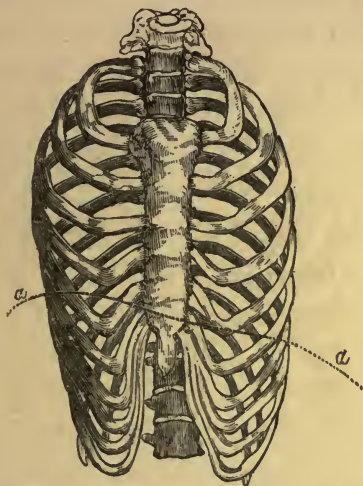
Diagram No. 5.



Illustrating the natural form of the healthy chest, and the proper position of the organs which it contains.

1. The spine. 2 2. The collar-bones. 3 3. The seven upper or true ribs. 4 4. The five lower or false ribs. 5. The breast-bone with which the true ribs are joined. 6. The sword-shaped extremity of the breast-bone. 7 7. The upper part of the two lungs, rising into the base of the neck. 8 8. The right lung seen between the ribs. 9 9. The left lung seen in like manner. 10 10. The heart. 11 11. A thin layer of muscle, the midriff, which divides the upper from the lower part of the chest. Medically, that part only is the *chest* which lies above the midriff. The midriff is arched, and forms a kind of dome upon which the heart and lungs rest. This circumstance, and the occupation of the cavity of the dome by the liver and stomach, cause the lower and front part of the lungs to lie before the upper portion of the liver, and the stomach, in like manner, to lie in part behind the heart. 12 12. The liver. 13 13. The stomach. 14. The continuation of the stomach, termed duodenum. This is the first part of the bowel, and is the frequent seat of pain. 15. The transverse portion of the large bowel or colon. 16. The upper part of the colon of the right side, bending inwards to become the transverse colon. 17. The commencement of the colon of the left side, being the continuation of the transverse colon.

Diagram No. 6.*



Yet these are not the days when ignorance can be pleaded as an excuse for such wrong-headed folly and wickedness; it is obvious that the stay is an appurtenance of woman only when she has arrived at a state of full development; but then it should be divested of all the apparatus of busks and bones that frequently encumber it, and its main bearing

* The chest distorted from the abuse of stays. If this figure be compared with the preceding, the effects of pressure will be seen at once. The figure is drawn from a chest in my possession. The letters *a a* refer to a dotted line, indicating the position of the midriff. How miserably the space allotted to the liver and stomach is curtailed!

should be limited to the upper half of the chest. The stay is, in reality, a support for the bust; such is its purpose, such alone its intention. How very ludicrous it would appear to put it on boys; and yet boys have as much need of it as girls up to the period of womanhood, and, I may say further, up to the period of marriage. But as stays form a staple article of female dress in this country, it may be well to point out their physiological action on the frame.

It is well known that the upper half of the trunk of the body, the *chest*, as it is properly termed, is constructed of a framework of twelve narrow bones, the ribs, which bend round from the spine behind to the breast-bone in front. These bones constitute the defence of the chief organs of the body, namely, the heart, the lungs, the liver, and the stomach, the two former being above, the two latter below. Upon these bones are spread out certain muscles of respiration and the muscles which support the spine, and the muscles are covered in by a layer of fat and by the skin. Muscles, it will be recollected, are the parts of the body termed flesh; they are red in colour, mode-

rately firm, receive a large quantity of blood and many nerves, and are the agents by which motion is effected. Moreover, they possess the property of becoming large and firm by exercise, and small and soft or flabby from disuse. Hence, the expression "muscular" is synonymous with "powerful." Now the first effect of stays is to limit the bendings and other movements of the trunk of the body; the body moves, as it were, "all of a piece," and the obvious consequence is, the degradation of the muscles from their firm to a soft and flabby state. Next, the stays press upon the muscles—how much, young ladies could tell if they would! But the muscles become injuriously squeezed between the unyielding stay and the hard bones of the chest. As a consequence of this treatment, the circulation of blood through the muscles, and the freedom of the nervous fluid, is interrupted. If it could be seen when thus compressed, the muscle would be found pale and exsanguine, and, being deprived of the quantity of blood necessary for its nutrition, much less its action, it becomes wasted, or, in technical language, atrophized. The muscles then, by the use of

stays, are weakened and rendered powerless, and the chest, at the growing period of life, is limited in its expansion, and the spine in its proper amount of muscular support. The consequence is inevitable; the spine sinks under the pressure of the superincumbent weight, or the child throws the pressure against one or the other side of the stay, and curved spine or spinal disease is established. How can it be otherwise? If we wished to produce curved spine, could we adopt a more scientific or certain plan?

Since the publication of the first edition of this work, I have asked many ladies the use of stays. I obtained but one answer: "The stay gives us a roundness of waist which we could not otherwise attain." This is quite true. The natural waist is broader from side to side than from before backwards; in other words, it is slightly flattened. God has made us so, must we not say wisely? dare we say unbecomingly? What right, then, have we to dispute Nature's laws and set up an ideal for ourselves? What right to establish a standard for the human form as we would a fashionable shape for a bonnet or a coat? Or if, as adults,

we persist in a right to modify ourselves, let not our children be made sufferers for our sins. The truth is that the round waist, being a distortion of the natural shape, is painful rather than agreeable to the eye of man.

One of the most inveterate pinchers among my lady acquaintance, who is, in reality, miserably distorted from the true standard of feminine perfection of form, and who has entailed upon herself in consequence a wretched state of health, adduces an argument in defence of stays that I find too prevalent among women, and too mischievous in its tendency, to let pass without a reply. Her delusion is that because the stays are not tightly laced they cannot be hurtful; but to understand the true relation of stays to the health of the body, we must go back to the period when they are first used—namely, to the period of childhood. I have already shown that stays restrict the motions of the trunk of the body, and consequently set an immediate limit to the growth of the muscles, which become, in consequence, weak and powerless. Besides this, they prevent the growth and expansion of the chest, and by a gentle but

continuous and daily repeated resistance they maintain the waist of the dimensions of childhood, whilst the rest of the body grows and enlarges into womanhood. A girdle of infancy is made to encircle the heart, the lungs, the stomach, and the liver of womanhood, and these important organs are compelled to seek accommodation in their narrow cell by mutual displacement. "A strong constitution," writes Dr. Dunglison, "is considered to be dependent on the due development of the principal organs of the body, on a happy proportion between those organs, and on a fit state of energy in the nervous system, whilst the feeble or weak constitution results from the want of these postulates." Dr. Dunglison might have added—"And the undue and inharmonious development resulting from the use of stays produces puny mothers and a puny offspring." I could forgive the adoption of stays at adult age, and would sanction any amount of constriction the votaries of tight lacing might think an improvement on nature: the process would be found too torturing to endure. That which I desire to see checked is the detestable refinement of cruelty that begins the proceed-

ing in infancy, before the intelligence of the child is sufficiently developed to resist this cruel infringement on woman's happiness and woman's health.

“Fashion is the war-cry of tyranny, and some years ago it was the fashion for women to appear with deformed bodies. Happily fashion has become more rational at the present time; and it is most sincerely to be hoped that British children will be educated physically as well as morally to perform the duties of British mothers.”

It should be steadily kept in mind that partial ruptures are not to be neglected, because if they should be, they are almost certain to become complete; the partial rupture is more easily supported, and is productive of less inconvenience and danger than a complete one, and it is therefore in the highest degree desirable to give to such cases the earliest possible and best attention.

There is now, I believe, no doubt remaining in the minds of our eminent practitioners, that certain classes of ruptures may be radically cured by the timely and skilful application of properly-constructed trusses. What, then, is

the class of cases which may be so cured? They are those which occur in young people who are blessed with good health; these may be generally cured provided the instructions respecting the wearing of the truss be scrupulously and religiously carried out. There is no ill to which the human frame is subject which requires more careful and unremitting attention than hernia—that is, if a radical cure is to be effected. This attention may, and probably does, prove irksome at first; but after a time, when the matter has become one of habitual practice, its irksomeness vanishes. When the rupture occurs in infancy a cure may be considered almost certain; but if the patient have attained to an advanced age, and the hernia is large and of long standing, though ease and comfort as well as safety may be afforded to an astonishing degree, there is no probability of a radical cure being effected; sufficiently strong adhesion of the separated parts cannot be set up, no effective contraction of the canal and rings can be induced; and hence the most that can be expected is that the parts shall be prevented extending, and be supported *in situ* in an easy and comfortable

manner. These remarks show again the importance of early attention; delay is, in this matter, particularly dangerous; without prompt measures the hernia would become irreclaimably established; with early care a cure may be effected, "*tutò citò et jucundè.*"

CHAPTER III.

Importance of preventing ruptures—Direction of ruptures
 —Action of an efficient truss—Principle of the same
 —Single trusses—Double trusses—Mode of applying
 a truss—Time for putting on and removing a truss—
 Care necessary in applying a proper truss—Liability
 of a single rupture to become double—Rules for
 guidance in describing a rupture in making applica-
 tion for a truss.

A RUPTURE presents us with a striking illustration of the truism that “Prevention is better than Cure;” better in every way, more agreeable, safer, and cheaper. The wearing of a truss is too often a disagreeable matter, but this commonly arises from defects in construction, or from want of proper adjustment, without which latter condition the most perfectly-constructed truss may be both inconvenient and useless.

The portion of intestine forming a rupture in the groin usually takes a direction forwards, downwards, and inwards (these directions refer

to the middle line of the body). A truss properly constructed, that is, so as to oppose resistance in these directions, if well fitted and adapted, does not cause, after the first few days, any serious inconvenience, and when the workmanship and finish are good and delicate, there is little likelihood of its being detected through the dress.

Patients, on applying for their first truss, usually place their hands on their groins, making firm but gentle pressure upwards, backwards, and outwards, with the tips of their fingers, and in that position say that they feel most support; now as Art is most successful in proportion to the fidelity with which it imitates Nature, it will be at once understood that the kind of support to be demanded in a truss is, a constant and firm but, at the same time, gently-yielding pressure, very much resembling that which would be afforded by placing the flat tips of the fingers, and employing with them against the affected part such pressure as would be to anyone the most simple and natural.

These being the requirements for the principle of an efficient truss, it will be perceived

that it must be constructed on the following general plan. The spring which encircles the body should be so arranged that its curves will be coincident with the outline of the part of the body which it surrounds, and should be connected with the pads bearing against the hernial openings in such a manner that no motion of the body shall be able to displace them, when they shall have been once properly applied. The pressure should be principally backwards and upwards—all projections of the pelvic bones being allowed to escape it, as far as possible, for comfort's sake. The force employed should not be greater than is required to effectually retain the rupture within the abdomen, and no galling understraps should be required as a part of the apparatus. It is reasonable to suppose that a truss constructed in this manner will be found to be both efficient and comfortable, and to fulfil every reasonable requirement. I venture to state that the "Orthonemic Truss," for which Her Majesty's Royal Letters Patent have been granted, does supply these desiderata, and will be found to fulfil every anatomical and physiological condition. The orthonemic truss, though double, is lighter than almost any

single truss, which is no slight advantage. A full description of the truss will be found in the next chapter.

Trusses cannot prudently be purchased in shops haphazard, as an ordinary article of manufacture, but should be selected by an experienced mechanician, and suited to the speciality of each case.

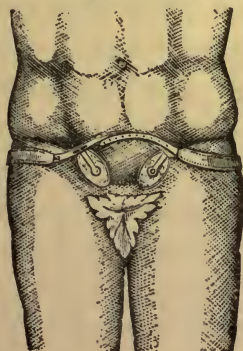
With respect to the putting on of a truss, certain points, at first sight trifling in themselves, should be carefully observed. A truss should never be put on whilst the patient is in the erect posture, but always while he is lying down, and the same position of body should be maintained while the truss is being removed—for in this way alone can the rupture be prevented descending. It is evident, then, that the proper time for putting on a truss is before rising in a morning, and that for removing it is after having lain down in bed at night. In the recumbent position there will be no fear of the rupture descending—as there will be no muscular efforts of a kind calculated to press it down, and the ordinary superincumbent weight of the other organs will be removed.

The pressure of a truss has a tendency to produce thickening of the walls or sides of the hernial canal, and rings, to contract them, and to promote their adhesion by exciting the effusion and deposition of coagulable lymph. This is the object in view in all infantile ruptures, in which cases it is desirable to wear the truss uninterruptedly—night and day—so as to have the pressure on the parts continually for several years. Of course the benefit of this action of a truss will be rendered entirely nugatory if, by neglect of the above precaution, the hernia should be allowed at any time to descend—which it cannot possibly do without breaking down the adhesions already established, and reducing the canal to the precise condition of permeability which it possessed before any adhesion whatever had been set up by the pressure. In this way the attention of months, and even years, may be thrown away by a single act of carelessness or inattention.

Great attention should be paid to the correct location of the pads of a truss by a patient, because upon their accurate application much of his comfort and safety necessarily depends.

It is not at all an uncommon occurrence, for persons to come back to the truss-maker complaining that their trusses are not comfortable, and it very frequently turns out, upon examination, that the discomfort complained of is due to the incorrect application of the pads referred to. The true position of the orthonemic truss is indicated by the subjoined diagram, and the same representation will

Diagram No. 7.



apply to all other trusses, so far as the pads, which are the most important parts of a truss, are concerned. The centre of the pad should be exactly over the hernial opening, and the pad should be inclined at a certain but varying angle with the median line of the body.

The reason for this particular position is evident on looking at the direction of the depression of the groin, which is always at an angle of about 45° to the middle line, and if the pad were to be placed at an improper angle, it would display a constant disposition to assume the proper one—every movement of the body tending to disturb it from its unnatural position, and to force it into the groin or fold of the thigh, in which situation it is little influenced by any movement of the body.

When persons are ruptured on one side only, they are said to have a single rupture; when on both sides, a double rupture. The single form is that which is most common—indeed, it would naturally be very improbable that two parts should give way at one and the same time; and for these single cases, a single truss—that is, a truss with only one pad bearing on the affected side of the body—is used. It very frequently happens, however, that persons who have been ruptured on one side, and have worn only a single truss, become, after a time, ruptured on the other side also. This arises, in the first place, from

both sides of the body being anatomically formed alike, and may be partly owing to the increased pressure which the sound side has to sustain—under which it ultimately gives way—and partly to the circumstance that where a weakness exists on one side, there is usually a corresponding weakness on the other. Now, if these facts suggest anything, it is that *in all cases* a double truss only should be employed. It is either false economy or false practice which indicates the use of a single truss in any case; because the patient frequently becomes afterwards the subject of the double form, and is always liable to it—and by the employment, from the first, of a double instrument, this unfortunate result would be prevented, and much consequent inconvenience avoided.

Hence theory suggests, and practice bears it out, that in every case, whether of single or double rupture, a double truss should be used, and the experience of the last twenty years has convinced me that this is the only proper course to be adopted. I have said that it is very common for persons with a single rupture, for which they have worn a single truss, to become, at

some future time, the subjects of double rupture; but I have never known a case of a patient with single rupture, who from the first has worn a double truss, becoming the subject of double rupture, and I have no doubt my own experience in this matter is borne out by that of others. The support on the unruptured side being greatly increased by the pad, it of course becomes next to impossible that the bowel should protrude there; and another advantage worthy of attention is, that by supporting both sides of the body instead of one only, the bracing-up is felt to be more equal, well-balanced, so to speak, and deprived of that irksome feeling of one-sidedness which accompanies the wearing of a single truss; moreover, the double truss having more points of support, is very much less liable to become displaced, a consideration of no small moment.

When a truss is required, it is always desirable that the truss-maker should be allowed to examine the case and fit on the truss, as many a trifling alteration or adjustment, on which the comfort and safety of the patient may perchance depend, will probably suggest itself to his practised eye which would escape

the notice of the wearer. As, however, there are many cases in which a personal interview is impossible, owing to distance, ill health, or other cause, I append a few simple rules for the guidance of persons so circumstanced.

I. Describe the cause of the rupture, and state whether it be recent or of long standing.

II. Distinguish very carefully the true position of the rupture, as to whether it be in the groin, the bend of the thigh, or elsewhere; whether it be single or double; if single, state the side of the body, right or left; if both, which is the larger.

III. Describe accurately the dimensions and shape of the swelling, and also of the opening through which it escapes. Particular attention should be paid to this point, as it regulates the size of the pads and the strength of the spring.

IV. State whether the abdomen be flat or round or protuberant.

V. Send an accurate measure of the body, taken two inches below the highest point of the hip-bones, in the directions shown by the diagram of the orthonemic truss applied. Diagram No. 7, page 51.

56 INSTRUCTIONS FOR ORDERING A TRUSS.

VI. State whether the whole of the tumour can be returned into the abdomen, and with what degree of facility.

If full and careful information on all these points be given, any truss-maker of experience will be able, from such description and data, to supply an instrument which shall be both efficient and comfortable to wear; but if, after these instructions shall have been fully complied with, he should still fail, a personal interview is indispensable. It is desirable to communicate with the truss-maker through the surgeon who has been consulted, and who will be able to afford much valuable information respecting the nature and special peculiarities of the case.

CHAPTER IV.

Various forms of trusses in use—Common truss—Ball and socket truss—Spiral-spring pad truss—Moc-main truss—Their merits and defects—Description of the orthonemic truss—The springs—The pads—Its advantages—Anatomical construction—Capability of adjustment—Machine work—Weighting the springs—Softness and smoothness of the pads—New clothing—Adaptability for export—Bathing trusses—Waterproof double truss best model for the purpose—Preventative use of bathing trusses—Hunting trusses.

HAVING in the previous chapters described generally the nature and causes of hernia, I will now endeavour to enumerate and describe the principal forms of apparatus which have been devised for the mechanical relief of the first and most common form of the malady—namely, inguinal hernia. This may be really divided into several heads, such as direct, oblique, internal, and external; but as the difference between these forms is chiefly ana-

tomical, and does not greatly affect the character of the instrument to be applied for its support, it will be sufficient for my purpose to notice the two main divisions, single and double hernia, as for these a different truss is, in practice, usually employed, although, as I have endeavoured to demonstrate, a double truss only should be applied in all cases, whether of single or double hernia.

Among the multitude of trusses now in use and generally recommended, I will select the four principal as types of the whole, the greater number of the others being only modifications of the recognised principles, to meet the requirements of particular cases.

I. The common or circular spring truss.

II. The spiral spring padded truss.

III. The ball and socket truss.

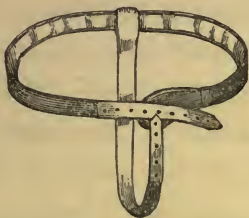
IV. The moc-main lever truss.

I will first describe the construction of these different forms of trusses, and then proceed to point out what are, in my opinion, the merits and defects of each.

First then of the common or circular spring truss, fig. 8, which is by far the most generally used. It consists of a steel spring surrounding

the pelvis or hips, shaped so as to follow, as closely as possible, the configuration of the

Diagram No. 8.



The common or circular spring truss.

body; this is effected by causing it to assume something like the shape of a sabre, by bellying it downwards in the parts which cross the vertebra, and (in a single truss) turning the tail end slightly upwards; the front part, which acts upon the pad, is again bent downwards, so as to reach the affected region. The pad is formed of a plate of iron, backed up with cork, and padded with flannel or other soft material, the whole being covered with smooth leather, as also is the body spring. This pad may be attached to the spring in two ways, either by being simply riveted on, or, as is done in the better class of trusses of this form, in the following manner—*i.e.* a groove or slot is cut in the front part of the

spring, and the pad is connected with it by means of binding screws, by which the wearer is able to move the pad forward or backward for its more accurate adjustment. The former method of fastening gives to trusses the name of the "solid pad truss," the latter, "the grooved." Among the many varieties or modifications of this truss is one very good one which is particularly efficient where accurate adaptation is required. The groove is cut in a curved form, vertically, on the widened end of the spring. In the pad is a series of holes arranged in the form of a curve, corresponding to that of the groove. The pad is made fast to the spring by a binding screw at its posterior extremity, whilst it admits of vertical movement in front. The common truss is frequently known as "Hart's," or the "English" truss. For double hernia, both ends are curved, and carry each a pad. With these trusses a linen strap is usually required, passing from behind between the legs, and hooking on to a stud fastened into the pad. In double trusses a strap is used to connect the two pads, and in single trusses the band which covers the body spring is continued in

the form of a strap until it completes the circumference by being fastened to the pad.

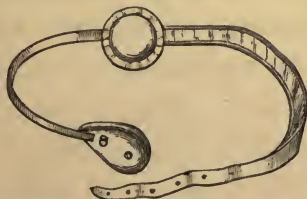
Diagram No. 9.



The common or circular spring double truss.

The spiral-spring padded truss differs from the circular spring trusses in having a steel spiral spring coiled in the heart of the pad; the body spring does not encircle the pelvis in this variety, but terminates in a round pad at

Diagram No. 10.



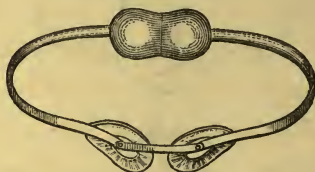
The spiral spring pad single truss.

the centre of the back, under which pad also a small spiral spring is concealed. The body spring rotates upon this back pad by means of a screw, shouldered so as to avoid friction; as

62 BALL AND SOCKET SINGLE TRUSS.

respects the position and shape of the front pad, the principle is the same as that of the common truss. In double trusses the round pad at the back is replaced by one of an ellip-

Diagram No. 11.



The spiral spring pad double truss.

tical form, having a vertical hinge joint at the centre; the spring is composed of two parts, the posterior end of each being screwed to the corresponding side of the back pad.

The ball and socket truss, like the spiral-spring pad truss, has only a semi-encircling

Diagram No. 12.



The ball and socket single truss.

spring with a round pad at the back, to form the fulcrum by the aid of which the front pad

is made to exert its pressure on the hernial opening. Unlike every other form, however, the front pad is not attached immovably to the spring, but swivels upon it by means of a ball and socket, or universal-motion joint, placed in the centre of the pad. One peculiarity of this truss is, that in the single form it is put on from the side opposite to that on which the rupture exists, so that a left rupture requires the truss to be placed over the right hip, and *vice versâ*; a right rupture requires it to be put on over the left hip, and consequently the anterior portion of the spring passes completely across the abdomen. Many persons are ignorant of this, and consequently put on their trusses from the wrong side, thus making the instrument very uncomfortable to wear, besides not only destroying its utility,

Diagram No. 13.



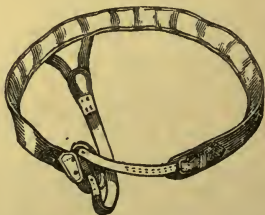
The ball and socket double truss.

but by the wrong location of the pad, really using it as a lever to force out the rupture

instead of retaining it. In double trusses, fig. 13, the back pad is constructed in the same manner as in a double spiral spring pad truss.

The moc-main, or lever truss, was a bold innovation on the principles recognised in the foregoing examples. The inventor of this instrument proposed to dispense with the body spring, before deemed absolutely necessary, and to supply its place with a soft web

Diagram No. 14.



The moc-main single truss.

strap encircling the pelvis. To this is attached a pad composed of a substance procured from the "silk-cotton tree" in India, whence the truss derives its name,* and not, as many people suppose, from any mechanical principle involved in its construction. To the top of this pad is attached a short lever spring placed

* Vide *Lancet*.

vertically, with a stud at its lower extremity to which a strong strap, passing from behind under the thigh, is tightly buckled.

Besides these four trusses, there is a host of patented articles of little use, or only available for special cases; these it will not be necessary for me to speak of, much less to describe.

Having now given a brief account of the construction of these instruments, I think I shall be able to show, from a recurrence to the paragraph (page 48) which describes the requirements of an efficient truss, that none of them fulfil perfectly the conditions necessary for the effectual and comfortable support of hernia.

The common truss is one of the cheapest and most easily applied, its chief recommendation being its cheapness; but it fails in one material point, inasmuch as it affords a backward pressure only, and not that upward lifting force which is so great a desideratum in the construction of a truss; furthermore, in the generality of cases, an under-strap is required to keep the pad in position, or it would otherwise ride up and become displaced; any truss which requires this trouble-

some and inconvenient appendage *must be imperfect.*

The spiral-spring padded truss claims the advantage of giving softer and more bearable pressure over the affected parts, and in light cases will be found to be very efficient and comfortable; but it will be seen, as Mr. Arbuckle of Edinburgh, in a very ingenious paper, points out, "that in supporting a rupture requiring any amount of pressure to keep it in place, the spiral springs in the pad are pressed flat before the truss comes into play; and, besides this, the body spring acts on the pad in a forward or downward direction, or in any way, indeed, but that which gives the upward lifting pressure required."

In the spiral-spring padded truss, the ball and socket joint, by means of which the spring is articulated to the pad, gives great ease and freedom of movement, but it is by no means secure. So long as the pad presses in a straight, backward direction, it completely covers the ring, and retains the rupture within the abdomen; but should any sudden alteration in the position of the body take place, in consequence of its capability of universal mo-

tion, the pad is liable to tilt on any part of its circumference, thus allowing the bowel to escape, and (when the erect posture is resumed) presses upon it. Besides this, the pressure is, as in the other two trusses, a straight, backward pressure, and not an upward, lifting one, such as is really required; the back pad being the fulcrum, the same amount of pressure must be exercised there as in front, whatever inconvenience it may cause to the patient.

The inventor of the moc-main truss endeavoured to meet all these objections, and in addition, to dispense with the body spring, which, when not properly constructed, is, it must be admitted, a source of great annoyance; but in attempting to give ease he lost sight of security, which should ever be paramount, and thus laid his invention open to many serious objections. When the truss is first applied, on account of the body strap being connected with the *top* of the pad only, all the pressure is centred there, where in reality it is least wanted; to obviate this difficulty, an under-strap is brought from behind and tightly buckled on a stud at the extremity

of the short lever spring at the bottom of the pad, and thus is the pressure equalized. So far so good : as long as the patient remains perfectly upright and motionless, the pressure is maintained equably ; but the instant he stoops the under-strap becomes loose, and its pressure on the spring relaxed, which in its turn ceases to influence the pad. Thus the rupture is allowed to escape, and not only so, but the upper rim of the pad presses just above the upper part of the hernial ring, starts the rupture, and when, on the resumption of the erect posture, the under-strap is tightened, and the spring regains its action, pressing on the rupture it irritates and inflames it, and thus aggravates the malady. Besides this, the extreme tightness with which the under-strap is required to be buckled frequently causes great pain and soreness of the perinæum. This is the most insecure and dangerous truss known, its only recommendation being the absence of a body spring ; but this, when well and carefully constructed, is rarely a source of any serious inconvenience. Scarcely a day passes but some one, having worn one of these trusses, finds himself rup-

tured on the other side, and his previously existing rupture aggravated, and then discards the truss altogether.

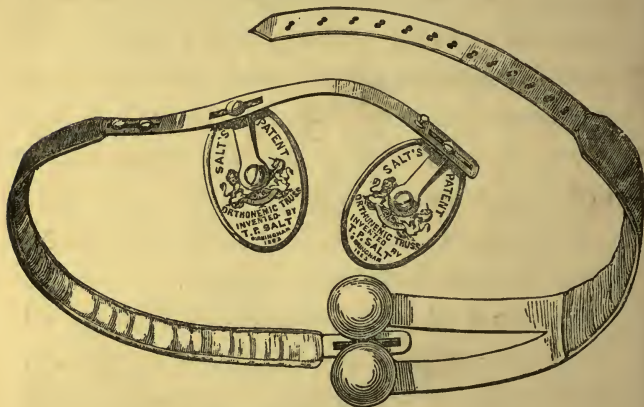
I agree entirely in opinion with the most experienced truss-makers, that a steel body spring is indispensable; and starting from this point, and taking into consideration the best mode of avoiding the objections above indicated, have constructed the orthonemic truss, fig. 15, for which Her Majesty's Royal Letters Patent have been granted. I venture to observe that this invention will meet all objections, and be found to possess every anatomical and physiological requirement; it is at the same time lighter than almost any single truss. A full description of its construction and merits follows.

The spring of the patent orthonemic truss is composed of two parts: the larger or posterior half being made to fit the body accurately, with a simple arrangement for correct adjustment; the end passes over the spinal column, and terminates in two antifrictional discs, upon the axes of which the spring rotates.

The second or anterior portion of the spring

referred to is made with two curves parallel with the lines of the abdomen, each front

Diagram No. 15.



The patent orthonemic truss.

piece being adapted to the configuration of the patient's body. At its extremities are two grooves to allow of the pads being placed nearer or more remote from the median line. Into these grooves slide the upper parts of two vertical springs, which are connected with the main, or body spring, by binding screws; the lower ends of these springs are attached to the centres of the pads, upon which they rotate. Being placed at an angle with the axes of the pads, they maintain uniform pressure, but

should a sudden strain occur, the resistance of the truss is increased. The pads are constructed upon an entirely new principle; usually they are made of a number of separate parts, forming a cushion, and united to the plate by stitching, but in the patent orthonemic truss the whole of the cushion is completed by means of a metallic capsule, after the manner of Florentine buttons.

The principal advantages of the orthonemic truss are as follows:—

1. Being constructed upon an anatomically correct principle, they are perfectly efficient, reliable, and comfortable.

2. Being made by machinery instead of by hand, any part of one truss will fit the corresponding part of any other, so that the wearer is able to replace any part which may have become damaged or soiled by use without recourse being had to the truss-maker.

3. They are capable of the most accurate adjustment; readily adapting themselves to the peculiarities of different cases, and so closely do they fit the shape of the body as to be entirely concealed from observation through the dress.

4. The governing spring of these trusses is *resisting* as opposed to *forcing*, the requisite pressure being exerted exclusively over the hernial openings, with slight lifting action; they have the still further advantage of offering the greatest resistance when the muscular effort is strongest, as in straining, coughing, or any of the exciting causes of rupture, which are referred to in an earlier part of this work.

5. The vertical springs are all weighted, and the amount of pressure each is capable of sustaining correctly marked. It is a primary maxim in truss-making, to reduce the pressure of the pads against the hernial openings to the minimum, consistent with employing sufficient force to retain the rupture in position; the custom has been to apply a truss, with a weak spring, in the first instance, and if this is found insufficient, to exchange it for a stronger, but this is not done with any degree of certainty, the amount of pressure added being only at guess. In the patent orthonemic truss this objection is obviated, so that if a spring, for example, of three pounds' pressure is found too weak to offer sufficient resistance

to the protruding rupture, a stronger is substituted, the additional strength being exactly known, and marked on the spring, and so on until the required amount of pressure is obtained. This certainty is found to be of great practical importance in the application of trusses, and also enables the patient, who, living at a distance, cannot always have access to the truss-maker, to make such alterations in the pressure of his truss as circumstances may require.

6. The pads cannot become displaced by any of the positions which the body assumes in the various exercises of walking, running, &c.; all the springs ride on pivots instead of being fixed, and thus the friction is reduced to the minimum, and all abrasion of the skin is avoided. The under-strap, or linen thigh-bands, which are attached to ordinary trusses as needful to keep the pads in position are unnecessary with the orthonemic trusses, and thus another source of great and general annoyance is obviated. Extra pads and bands can be obtained to enable the wearer to reclothe his truss when the old coverings become soiled by wear.

7. The pads made by the patent process are exquisitely smooth and soft, and present a most comfortable surface to the skin of the wearer.

Testimonials from the *Lancet*, and *Medical Times and Gazette*, and upwards of a hundred surgeons of Birmingham and the neighbourhood, and many patients who have experienced the good effects of the truss, are appended to this manual.

Persons who are ruptured should on no account indulge in the exercise of swimming unless provided with a suitable truss. The impetus given to the ruptured parts under these circumstances is considerable, and great danger is incurred of increasing the malady; the trusses usually worn are not at all adapted to the purpose, as, being covered with "padding," they become wet and unfit for after-wear; the adoption of a double truss is absolutely imperative, affording as it does uniform support to both the hernial regions. The truss recommended is a modification of the patent orthonemic truss, the difference being only in the substitution of waterproof materials, in lieu of the ordinary covering. The

facility with which this truss accommodates itself to the body during the exertion of swimming, and the certainty with which the pads remain *in situ*, recommend it to general adoption; indeed, persons not ruptured would do well to employ it as a safeguard against accident. When from any cause the orthonemic truss is not available, the best substitute is an ordinary truss covered with a smooth coating of vulcanite rubber, which is not affected even by sea-water, nor is it difficult of application.

In Hunting.—Whenever there is weakness in the hernial region, even should no rupture be present, it is most important to apply a double truss, which being required to act as a preventive only, need not be inconveniently strong. It will be obvious to the most casual observer of the varied and violent exertion to which the body is subject in “the field” when the parts are weak and lax, that the danger of rupture is imminent; add to this the occasional and unexpected jerk or strain which sometimes occurs, and the argument is irresistible. The orthonemic truss is specially adapted for the hunting-field, inasmuch as it affords not only a comfortable resisting force, but from its peculiar me-

chanism is suited to any emergency arising from an unexpected strain ; thus under ordinary circumstances the pressure is uniform, but supposing that any undue force is brought to bear upon the hernial regions, the vertical springs are immediately set in action, and increased pressure on the parts is the result. Besides the actual safety arising from this temporary use of a truss, there is satisfaction in knowing that one is assured against accident ; as the truss is readily applied, so it may easily be removed when the necessity for its use shall have ceased. It need not be apprehended, as is the popular notion, that by wearing a truss thus occasionally the parts would be rendered more susceptible of mischief ; this is not so, as the pressure by the truss is chiefly made when the weak parts are subjected to unusual muscular exertion.

CHAPTER V.

Mechanical treatment of various forms of rupture: irreducible; inguinal; femoral; scrotal—Suspender for irreducible rupture; umbilical; congenital; infantile; adult—Requirements of an efficient support—Inefficiency of spring trusses—Ordinary belts employed—Salt's patent belt—Advantages of children's umbilical trusses.

A RUPTURE is termed irreducible, as has been already stated, when it cannot be returned into the abdomen, or can be only partially returned. This obstruction to its ready return to the natural cavity may arise from adhesions taking place in the canal in the form of thin membranes or bands, which occasionally stretch themselves across the ring, or from the rupture being of very large size as compared with the opening through which it has escaped and through which it has to be returned. The treatment proper to be applied to an irreducible rupture, made so by either or both of the first two causes, is rather different

from that required by one proceeding from the third cause. Operations are now very rarely had recourse to for irreducible rupture, unless indeed it be strangulated, as it will almost always admit of successful treatment by medical and mechanical agency. In the first case, then, if we seek for the resistance to be overcome, we shall find it in these morbid adhesions or growths which are always liable to exist in a neglected rupture; it is plain, then, that the treatment to be pursued must be one which shall have the effect of removing these adhesions, and thus setting the rupture free. I believe that the best means which can be employed for the attainment of this object are—the retention of the recumbent posture; the frequent use of warm water; chamomile and other fomentations of the parts, and the application of the taxis after each fomentation, and as often between as possible; the taxis, however, must be employed very carefully and gently, as mischief may otherwise ensue. These means will almost invariably effect the return of the rupture; but it is wisest in every case presenting difficulty to have recourse without delay to a

surgeon : these remarks, however, serve to indicate the treatment to be employed until his assistance can be obtained. In the other case, the cause of the irreducibility is, as we have seen, the large size of the rupture as compared with the ring ; this being so, if we can gradually and slowly diminish the quantity of fluid contained in the protruded bowel, and thus reduce its size, we shall be in a fair way to effect its total return. The following is the safest and most effectual method of accomplishing it :— A well-made and accurately fitting truss is constructed, the pad of which is hollowed into the exact shape and size of the rupture ; the truss is then applied, and its use continued night and day ; time after time thin layers of some soft materials are placed in the hollow of the pad, until at last by these successive additions the concavity is filled up and the hernia reduced ; the gradual and surrounding pressure thus afforded acts as a sort of constant “ taxis,” and in nearly every case accomplishes at length the complete reduction of the rupture. A similar result may be obtained by two pads, one placed upon the other, with a screw passing through the upper pad,

and pressing with increased force at will; my experience favours the former method as being more simple and quite as efficient. I must remark, however, that when the rupture under the aforesaid circumstances has been once returned, a more than ordinarily efficient truss is required to prevent a repetition of the mischief, and the directions given (p. 49) for the application and removal of a truss must be more carefully attended to than usual. The orthonemic truss is specially suited to such cases, from the regularity of its pressure and the certainty with which it retains the rupture within the abdomen.

In cases of incipient rupture, or where its occurrence is apprehended, if the constitutional treatment is found insufficient to relieve the weakness of the parts, temporary recourse must be had to mechanical aid, which in the hands of a man of experience will almost invariably prove successful in averting the impending evil: in such cases we must employ a lightly made and easily-fitting truss, exerting only a sufficient amount of pressure to relieve the parts of the undue weight which is thrown upon them and which threatens eventually to

produce rupture ; thus relieved from this unnatural strain by surgical and other treatment, the ring and canals are contracted, and further the gentle but steady continued pressure of the pad promotes the deposition of lymph, thereby materially assisting the cure.

The patent orthonemic truss is extremely well adapted to this purpose also, on account of the ease and certainty with which the pressure of the pads can be regulated, and their perfect immovability insured, when once placed in position.

The trusses required for support of femoral hernia do not differ materially from those employed for inguinal rupture ; a slight alteration in the curve and dip of the springs renders them equally applicable.

In the treatment of scrotal hernia much care is required. If the rupture can be completely returned into the cavity of the abdomen, an ordinary well-fitting truss with the curves and lengths of the spring specially adapted, will answer very well ; but if, as is frequently the case, it can be only partially returned, or not, at all, a truss would only be injurious, as it would press upon and inflame the protruding

bowel, and tend to force down the rupture to a still greater extent, and thus increase instead of mitigate the severity of the case: in such instances the only "appliance" which is useful is an accurately-fitting suspensory bandage, with (if the rupture be large) shoulder-straps or braces to assist in sustaining the weight, and a running string round the edge of the bag to diminish its size. This bag is attached to a broad piece of elastic webbing, passing across the abdomen when the same is flaccid and of large dimensions, and is found to be extremely comfortable. The mode of application is as follows:—The patient should be in a recumbent position, the rupture is then reduced as much as possible, the running string tightened as much as can be borne without inconvenience: thus any increase in the size of the rupture may be arrested. If this process be gradually repeated day after day, it is quite possible, if not to return the entire "rupture," so far to reduce its bulk as to render it at least tolerable.

Infants' trusses require to be even more carefully constructed than those for adults; they must be made to fit most accurately. It is desirable to apply them at a very early age,

but owing to the extreme sensitiveness of the skin of children, it is very difficult to employ a spring possessing sufficient power to retain the rupture in position without injury to the soft parts of the body. My experience is against employing them much before the age of a twelvemonth. The pad should be rather flat on the surface and only of sufficient size to completely cover the ring, and securely retain the protrusion in position. Both spring and pad should be coated with rubber to prevent the surface becoming harsh, which with young children it always does when the spring is covered with the ordinary leather padding.

I will now consider the various forms of trusses which are employed for the support of umbilical hernia, and first describe those in use for children. I set aside all the elementary contrivances, such as bandages bound tightly round the abdomen with leaden plate or a piece of cork (as is the usual custom) located in the centre to compress the navel, as useless for the purpose of effecting a cure, and worse than useless inasmuch as they tend to produce, by constricting the abdomen, another and a far more inconvenient and dangerous rupture,

namely, "inguinal," or "femoral." The instruments required for effectually and comfortably sustaining a navel rupture are much more simple than those employed for other forms of rupture, inasmuch as no upward-lifting force is required, but simply a direct inward or backward pressure of sufficient power to restrain the protrusion, and yet not strong enough to gall the sensitive skin of the infant. Add to these conditions that of immovability of the pad, and you have a comfortable and an efficient instrument. I discard the employment of steel spring trusses for infants on account of the extreme sensitiveness of the skin, which cannot endure the hardness of the material usually employed as a covering, or the force of the pressure arising from a steel spring. One of the simplest forms of navel trusses is a piece of sheet vulcanized india-rubber about two inches wide, cut to the dimensions of the body, joined, and fitted in the centre with a small covered cork pad; this when properly fitted answers tolerably well. These meet the requirements of a large class of patients where cheapness is an important consideration; otherwise they are not satisfac-

tory—the cork is too rough and hard to the skin, and the rubber, by confining the perspiration, is also objectionable. The next advance is the substitution of a jean belt shaped to the figure of the abdomen, with rubber sides to afford elasticity and compressing power; a rubber pad inflated with air is inserted to press the navel; the belt lacing behind. These belts are more efficient than those previously described, and when the abdomen is large and flaccid, answer very well. Sometimes, however, they do not furnish sufficient support to the umbilicus. The most perfect contrivance is an invention I have patented, and which appears to me to meet every objection and to supply every desideratum. It consists of a band of extremely soft and flexible rubber web which by means of a clasp at each end hooks into a pad; the facing is made of soft white kid, fastened to the metallic plate by the patented machine process, instead of by stitching. This mode of manufacture renders the surface so smooth as to be altogether incapable of injuring the skin. In each of the clasps is a series of holes, to allow of the belt being lengthened with the growth of the

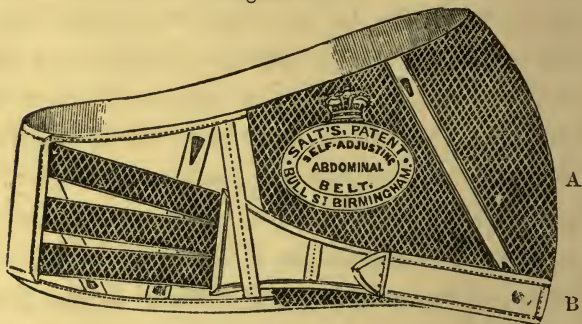
body, or to increase or diminish the pressure, as circumstances may require; by reason of the clasps swivelling on a stud on the pad, the latter is rendered immovable. This belt possesses all the softness and gives the ease and comfort of the jean belt, combined with the advantage of being much more readily applied and removed.

In severe cases of umbilical rupture in the adult a support somewhat different is required from that for children; it is not sufficient to retain the parts in position merely by means of a pad pressing against the umbilical opening, but it is at the same time necessary that support should be given to the parietes or sides of the abdomen, the whole of which are to be supported, so as to diminish the strain against the navel as much as possible. A truss, however well constructed and carefully fitted, is not sufficient to fulfil *all* the required conditions; sometimes an elastic abdominal belt with central pad and cushion is employed. The belt is made either to draw on the body, to lace, or to buckle. The objection to the first form is the absence of any means of altering the size, as occasion may require, the second

and third forms being merely attempts to remove the objections to the first. Considering that the following requirements for a perfect belt are necessary—viz., first, to support the abdomen generally, and thereby relieve the umbilicus of as much pressure as possible; secondly, to so arrange the pad that it shall not become displaced by the varied movements of the body, and yet be capable of regulated pressure; thirdly, that the surface of the pad in contact with the ruptured part should be as smooth as possible, by its friction being reduced to the minimum, it occurred to me that an improvement of no mean importance might be effected in the construction of these belts. From these data I think I have succeeded in contriving a belt which will be found an improvement, and I may go further than this, and say *is* satisfactory. A brief description of the invention will be sufficient. The front, or abdominal part, is made of an elastic fabric shaped accurately to the figure, same as shown in the diagram of abdominal belt, fig. 16, except that for umbilical rupture the strap B would fasten at the centre A over the pad which presses against the navel. Wings of

non-elastic material are attached to the "abdominal part," and into these wings longitudinal rubber bands are inserted, to relieve the back of any excess of pressure. The two

Diagram No. 16.



ends pass through slits or openings on the hips (vide diagram); a soft rubber pad, inflated with air, is inserted and suitably fixed. This belt may be applied and removed with the greatest facility, and the support regulated entirely at the will of the wearer.

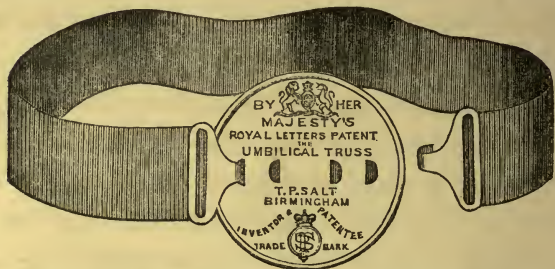
A similar belt is admirably adapted for cases of ovarian dropsy, obesity, and pregnancy, as they simply require the removal of the pad and the straps arranged precisely as shown in Diagram 16. The oblique direction of these straps is of much greater

importance than would at first appear; by being so placed, the fibres of the rubber are placed in the same direction as that of the muscles whose action they are intended to simulate; hence, there is no antagonistic force operating, as is the case when the elastic bands are arranged longitudinally. Moreover, the weight of the abdomen is thrown on the bony parts of the pelvis, and thus that sensation of weight which most persons experience in wearing ordinary belts when the abdomen is large is entirely obviated. Further, whatever alteration may be required in size of the belt, either from increase or decrease of the figure, may be instantly effected, and that without removing it from the body; uniformity of pressure can also be maintained with the greatest accuracy and ease.

For those whose ruptures are small, and who do not require any support beyond a simple inward pressure to retain the hernia, I have devised another simple form of belt, which consists of two main parts, *i.e.*, the pad and the encircling belt. The band or belt is made of soft elastic rubber web, which concentrates its compressing power on the pad.

In the pad lies the chief novelty of the invention: it consists of a circular disc or shield

Diagram No. 17.



(Exhibited at the Medico-Chirurgical Society, London, Dec. 12, 1864.)

of metal, into which is fastened by machinery a facing of soft leather (for which letters patent have been taken), backed up for solidity with suitable materials; to give softness and flexibility to the pad, a rubber cup is inserted, having a spiral spring coiled within, which causes the pad to follow the bowel in its return, and to retain it securely within the abdomen. The belt is attached to the pad by a pair of clasps, and by a novel mechanism are made to secure the ends of the elastic web without stitching, thus rendering this part of the apparatus much neater and less costly to manufacture. The ends of the clasps are bent over to form a hook, fitting into a series of

holes on each side of the pad; they are cut in a semicircular form on the outer edges, to admit of the belt moving on the body without fear of displacing the *pad*. The mechanism and manufacture of the whole is as perfect as possible. A similar belt is made for children, except that for such, a spiral spring is not required, as was mentioned in Chapter V, treating of umbilical rupture in children.

The chief advantages of these belts may be briefly recited:—

1. Their simplicity, lightness, and the facility with which they can be applied.

2. The perfect immovability of the pad when once placed in position over the hernial opening.

3. The exquisite smoothness and roundness of the edges of the pads, which render them altogether incapable of rubbing or abrading the skin.

CHAPTER VI.

Prolapsus uteri : Definition—Different forms of pessaries employed—Ring pessary—Stem pessary—Zwanke's pessary—Collapsing pessary—Uterine support belt—Prolapsus ani : definition ; supports employed—Rectum-plug—Elastic cord support—Prolapsus truss.

THE malady called Prolapsus, though not strictly included in the title of this manual, is yet so intimately connected with it in the nature of the mechanical supports required for its relief, that I deem it advisable to include it. There are two principal kinds of "prolapsus," namely, prolapsus uteri and prolapsus ani. Prolapsus uteri (which is the more common form of the two), is, as its name imports, a descent of a portion of the womb into the vagina—so that it may occupy that canal, or it may even protrude externally, and, of course, causing great inconvenience and suffering, besides incapacity for the active duties of life. It usually arises from difficult labours, but may arise from debility and other

causes, and consequently, is not unfrequently found to exist in unmarried females. The appliance required is one which will securely support the descended parts within the body, as nearly as possible in their natural situation and position. Innumerable instruments, varying in form and material (pessaries) have been invented from time to time with this object in view—many are useless, and some positively injurious. Amongst those usually employed are the old ring pessary, the stem pessary, Zwanke's pessary, and Salt's collapsing pessary. 1. The ring pessary is the cheapest and most ordinarily used. 2. The stem pessary is an improvement—it consists of a hollow gutta percha curved stem, having a cup at one end which supports the prolapsus; it is secured at the other, or external end, by straps passing round the body. 3. Zwanke's pessary, a very superior instrument to either of the two described, by reason of the facility with which it may be modified by the surgeon to meet the requirement of the case under treatment—it is made either of German silver or of vulcanite; the latter being impervious to moisture is more to be commended. An improvement

still further has been effected by the introduction of "the Butterfly Pessary," so called from the sides of the instrument resembling the wings of a butterfly. From the narrower part of these wings, which are hinged, is attached a stem, so arranged as by gentle rotation to act upon the wings, and thus expand them to the required extent. Greater facilities for introduction and removal are present with these pessaries than any other; to render them perfect, suitable attachments

Diagram No. 18.



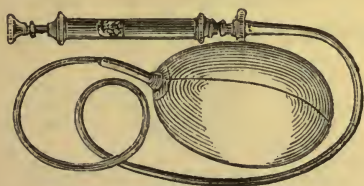
The butterfly pessary.

have been added; these pessaries will be found efficient for a large number of cases.

When the parts are too sensitive to bear

the hardness of texture which the above present, I have devised an instrument which is called the Collapsing Pessary. It consists of an india-rubber bag attached to a narrow tube of the same material, through which it can be distended with air to any required size by means of a small air-pump, which is detached from the tube of the pessary so soon as

Diagram No. 19.



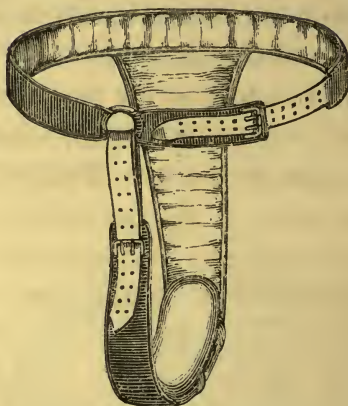
Salt's collapsing pessary.

it has been inflated. The chief advantages of this invention consist in the extreme facility with which these instruments can be applied—their lightness, softness of surface, elasticity, and freedom from odour—they are introduced collapsed, and afterwards inflated to the required shape.

For very severe cases of external prolapsus, I have devised another appliance, see fig. 20, which will be found effectual in the most

extreme cases. It consists of a well-padded and soft leather band which encircles the

Diagram No. 20.



Salt's support for prolapsus uteri.

waist, and from which depends a strap in the shape of the letter V; it passes between the thighs, and buckles to a loop in front; an extremely soft and elastic pad slides upon this strap for facility of adjustment. The pressure is regulated with great precision. The various parts of the belt are prevented from unduly pressing against the body, each part being suspended, as it were, on a rubber-ring, which slightly yields when the apparatus is placed. The woodcut diagram will show at a glance the

mode of its application. I may here observe, *en passant*, that these pessaries and supports must be considered merely as types of the kind of instruments employed for prolapsus—almost innumerable modifications may be found in practice; as to which is the best form to employ, depends altogether on the exact nature of the case under treatment. This the medical practitioner alone is able to decide, and will at the same time give the necessary instruction as to which to choose, and where to obtain it.

Prolapsus ani is a similar malady to that last described, except that in it the protrusion occurs at the rectum or lower portion of bowel instead of at the vagina. The instruments used for its relief are fewer and more simple than those employed for prolapsus uteri. The first and most rudimentary of these is a "plug," made either of metal, ivory, rubber, or vulcanite; this, answering to its name, literally plugs the rectum, and so confines and supports the depending part. Next to this is an elliptical ivory pad, made to press against

the orifice of the anus by means of elastic cords, which pass through a hole in its centre. The extremities of this elastic cord receive attachments of jean or satin, constructed in the form of a light waist-belt. The third form consists of a cushion and plug combined, and is constructed in the following manner:— A rubber plug or teat is attached to a square piece of rubber (Diagram 21) having a strap at each corner, in length about 9 inches; a cushion, of convenient size, is made of two layers of rubber, with a central hole sufficiently large to slip over the plug; this cushion is inflated with air. The four straps referred to are secured by linen bands, which, in their turn, are connected with the padded waist-band. The rubber plug is first inserted within the rectum, and the straps both in front and behind tightened, until the requisite pressure is obtained necessary to keep the plug in position. This is a very comfortable support to wear, and in recent cases where the descent is small will be found efficient, but for severer cases the fourth or last form of support is more reliable.

The construction of the fourth is very

simple, and its action reliable. A light steel spring encircles the waist, and at the centre of

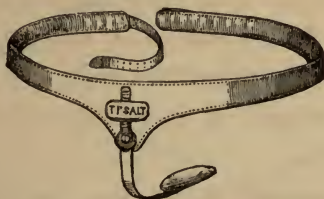
Diagram No. 21.



The cushion and support for prolapsus ani.

the back is attached a spring curved to the form of the body; on its extreme end is an ivory pad, shaped to that of a pear cut vertically; a lateral movement is given to the instrument so that it may accommodate itself to the varying positions of the body, and a spring bolt rack is added to regulate the distance from the waist-band to the point of contact with the pad. This is a very efficient and satisfactory little support, and as comfortable as such an instrument may reasonably be expected. Diagram (No. 22) appended.

Diagram No. 22.



Spring support for prolapsus ani.



APPENDIX.

OPINIONS OF THE MEDICAL PRESS.

From the *Lancet*, December 5, 1863.

“Mr. T. P. Salt, of Birmingham, exhibited to the Royal Medico-Chirurgical Society, London, November 24, 1863, a new truss, invented and patented by himself, which appears to be possessed of the following advantages :—

“1. It affords, in addition to the usual *inward* pressure of ordinary trusses, a second or *upward* (lifting) pressure always required for support of hernia, and attempted to be given by a variety of clumsy contrivances, the chief of which is the linen strap from behind fastened upon a peg at the lower part of the pad. This is the only truss which gives the lifting pressure in an unobjectionable manner.

“2. By the peculiar mode in which the vertical or lifting springs are attached to the pads, no displacement of the pads can take place when once put in position ; neither can there be any friction of the skin over the hernial openings.

“3. The facility with which the position of the pads may be placed in relation to the median line of the abdomen, and the springs across the abdomen having curves coincident with it, the spring of the truss lies evenly against the body.

"4. The back support, consisting of two pads instead of one—one placed above the horizontal line (spring), the other below—gives greater stability to the front part on which the pads are suspended ; hence this truss is more likely to remain *in situ*.

"5. Every part of the patent truss is made by machinery instead of by hand ; hence any portion damaged or soiled can be rectified without the necessity of sending the truss to the instrument-maker.

"6. The pads are an eminent improvement. The fringed edges of ordinary trusses, in which the cushions are made by stitching, are constantly chafing the skin ; but by turning these cushions into a metallic capsule or clip, the edges and surface of the pads are exquisitely smooth and soft.

From the *Lancet*, December 31, 1864.

"Mr. T. P. Salt, of Birmingham, forwards us a very good abdominal belt. This gentleman, after reflecting upon the direction of the forces which exist in the fibres of the abdominal muscles, has constructed a belt which artificially supplies all that is naturally required. Thus, that portion that fits over the lower portion of the back simulates, by its non-elasticity, the bony attachments from which the abdominal parietes originate. From this proceed on each side three elastic bands, having a direction at the same time downwards, forwards, and inwards. These terminate in one broad band, fastening in front of the anterior portion of the belt, which is shaped to the form of the parts which it is to support and compress, and is composed of an elastic material, the fibres of elasticity

of which are arranged in a corresponding direction to the muscular fibres beneath them.

“The result obtained from the wearing of this belt, according to the maker, is, that the uterus and its contents are efficiently supported by a lifting pressure proceeding gradually upwards, and at the same time gently inclining backwards. In case of “pendulous belly” the inordinate accumulations of fat around the abdominal walls are so supported that their weight is borne with the least possible inconvenience to the sufferer, instead of painfully accumulating in rucks or transverse folds in front, as occurs in the wearing of many belts.”

From the *Medical Times and Gazette*, February 6, 1864.

“Mr. Salt, of Birmingham, has devised a truss for inguinal hernia, which was exhibited at a recent meeting of the Royal Medico-Chirurgical Society. It is light, easily concealed, and thoroughly efficient. The pads press inwards as well as backwards, and by a very ingenious arrangement, permit of movements the most extensive and various without displacement, and without impairing the greatest nicety of support. There are several principles in the truss which are quite new, but which we believe are based on strictly anatomical and physiological data.”

From the *Medical Times and Gazette*, February 25, 1865.

“Mr. Salt, of Birmingham, has devised an ingenious belt for cases of enlargement of the abdomen from whatever cause. It appears to us to possess the following advantages :—

"1. It adapts itself accurately to the figure, affording an equable and even support, which by a simple contrivance, accommodates itself to the increasing dimensions of the abdomen, and renders an additional belt of larger size altogether unnecessary.

"2. It can be applied without assistance.

"3. It is extremely light and durable, and being of pervious texture is not unduly heating to the body.

"We have lately had an opportunity of trying it in a case of enlargement of the abdomen from obesity, with the result of completely relieving many of the symptoms which had previously caused the patient pain and annoyance."

From the *Medical Times and Gazette*, April 29, 1865.

"SALT'S NEW UMBILICAL TRUSS.—Certainly nothing can exceed the finish of the truss which has been sent us as a specimen, and we commend it to the attention of our surgical brethren. Mr. Salt is already favourably known for his well-devised and comfortable abdominal belts."

From the *British Medical Journal*, Feb. 27, 1864.

"At a branch meeting of the Provincial Medico-Chirurgical Society held in Birmingham, Mr. T. P. Salt (surgical mechanist in that town) exhibited a truss that he had lately invented. The chief improvements, and at the same time novelties, appeared to consist in—1. The mode of articulation of the pad, with that portion of the spring round the body, in front of the pubes, giving to it a new force, viz., a lifting pressure similar to that exerted

by a patient himself when endeavouring to keep his rupture within the abdomen ; 2. The springs by which this force is applied freely permit all intended changes of the position of the pads, whether for the greater comfort of the patient, or for their position over a more apposite site of the abdominal walls, at the same time that they admirably prevent any accidental or chance displacement ; 3. The 'fixedness' of the truss around the body is still further increased by a support consisting of two pads, placed one above and one below the body spring at the back ; 4. The pads themselves are almost perfectly flat, tending to render the constant wearing of the truss both as comfortable and ultimately as curative as possible."

From the *Dublin Medical Press*, June 14, 1865.

"DUBLIN INTERNATIONAL EXHIBITION.

"In pursuance of our intention of noticing the articles of medical interest in the Dublin International Exhibition, we have examined the case of instruments displayed by Mr. T. B. Salt of Birmingham. The articles exhibited by him are patent trusses and abdominal belts for obesity, pregnancy, dropsy, and umbilical hernia.

"1. ORTHONEMIC TRUSSES.—These are an improvement on the old form, inasmuch as they afford that upward, lifting force, which is so great a desideratum in the construction of trusses, by means of the vertical springs, by the aid of which the pads exert their pressure against the hernial openings, and to which they are attached in such a manner as to permit of their freely rotating to a certain extent to prevent friction and displacement, thus supplying every desirable motion, whilst, at the same time,

all those movements which might affect the security of the truss are completely guarded against. The pads are made by a new and peculiar method which does away with the cumbrous and uncomfortable stitching used in ordinary trusses, by employing a metallic clip to bind together the various parts, leather, padding, &c., which form the cushion, in the same manner as Florentine buttons are made. This renders them beautifully soft and smooth.

"2. TRUSSES WITH PATENT PADS.—These are ordinary trusses of a superior quality, fitted with pads of the same manufacture as those employed in the orthonemic trusses, except that they are pear-shaped instead of being oval. They are of various qualities, the better class having their springs plated or gilt to prevent rusting from the perspiration and moisture of the skin.

"3. THE UNI DUPLEX TRUSS.—This is an article suited for the foreign market, as it can be made to suit for right, left, or double hernia, one of the pads being removable; the pads are the same as those of the orthonemic truss.

"4. CHILDREN'S UMBILICAL BELTS.—These belts are remarkable for their simplicity and facility of application. They consist of a soft elastic band which hooks on to a small circular patent pad by means of a pair of clasps, which rotate upon the stud in the pad so as to prevent displacement.

"5. ADULT UMBILICAL BELTS.—These are similar to those last described, except that the pads are larger, and have a spiral spring coiled in their centres, which follows the protrusion in its return, and securely retains it within the abdomen.

"6. THE ORTHOREIDIC ABDOMINAL BELT.—This is an

invention for the more effectual and comfortable relief of dropsy, obesity, umbilical hernia, &c., and for affording support during the period of gestation, or enlargement of the abdomen, from whatever cause it may arise. For these purposes it is especially suited, as it admits of being enlarged with the increasing dimensions of the abdomen, and also affords an upward support in the direction of the muscles, instead of a straight one antagonistically to them, as is the case in belts which have their fibres of elasticity arranged longitudinally. The oblique pressure is obtained in this belt by arranging the fibres in the desired direction, and making the straps which fasten it to exert their pressure obliquely from the bottom towards the centre and top, thus completely supporting the bowels."

TESTIMONIALS

FROM SURGEONS IN BIRMINGHAM AND NEIGHBOURHOOD.

We, the undersigned, having carefully examined the mechanism of the patent orthonemic truss for rupture, invented by Mr. T. P. Salt, of Birmingham, are of opinion that it is constructed upon anatomically correct principles, and better calculated to fulfil the conditions of a good truss than any instrument of the kind we have seen; the workmanship is very superior :—

William Sands Cox, F.R.S.
 Oliver Pemberton
 D. W. Crompton, F.R.C.S.,
 F.L.S.
 Thomas Chavasse, F.R.C.S.L.
 V. W. Blake, F.R.C.S.
 Furneaux Jordan
 Alfred Baker, F.R.C.S.

Pye H. Chavasse, F.R.C.S.
 Langston Parker, F.R.C.S.
 David Nelson, M.D.
 Bell Fletcher, M.D.
 David Johnson, M.R.C.S.
 M. H. Clayton, M.R.C.S.
 David Bolton, F.R.C.S.
 James Russell, M.D. Lond.

- Edwin Chesshire, F.R.C.S.
 Samuel Berry, F.R.C.S.
 S. A. Bindley, F.R.C.S. (Exam.)
 George Jones, M.R.C.S. & L.M.
 Shirley F. Palmer, M.R.C.S.E.
 J. St. S. Wilders
 Alfred Hill, M.D., F.C.S.
 John Anthony, M.D.
 Redfern Davies, M.R.C.S.
 E. Vernon Blunt, M.D.
 Alexander Fleming, M.D.
 W. P. Goodall, M.R.C.S.
 G. H. Marshall, M.D., F.R.C.S.
 Thomas Swain, M.R.C.S.
 F. Jones, M.R.C.S.
 George F. Evans, F.R.C.P.L.
 T. H. Bartleet, M.B. Lond.
 John Elkington, M.R.C.S., &c.
 B. Walter Foster, M.D.
 A. H. Willington, M.D.,
 M.R.C.S.E.
 W. F. Wade, M.B., M.R.C.P.
 William Hopkins, L.R.C.P., &
 M.R.C.S.L.
 John M. Lister, M.R.C.S.
 W. H. Sproston, M.R.C.S.
 James F. West
 Malim Sharman
 James Johnstone, M.D.
 John B. Melson, J.P., M.D.
 &c. (Cantab.)
 Samuel Winter Burbury, M.D.,
 &c.
 James Harmer, M.R.C.S.
 Lumley Earle, M.D.
 A. Oakes, L.R.C.P. Ed., &
 M.R.C.S.L.
 Thomas Taylor, F.R.C.S.
 Josiah Clarkson, M.R.C.S. Eng.
 B. S. Robins, M.R.C.S. & L.S.A.
 J. J. Horton, M.R.C.S., L.A.C.
 Charles Porter, M.R.C.S.
 R. Middlemore, F.R.C.S.
 John Archer, F.R.C.S.
 W. C. Orford, M.R.C.S. &
 L.S.A.
 C. S. Meeke, M.R.C.S. & L.S.A.
 John W. Keyworth, M.D. Lond.
 John Clay, M.R.C.S.L., &c.
 Walter C. Freer, M.R.C.S.
 W. J. Scofield, M.R.C.S.
 T. Watkin Williams, M.R.C.S.,
 &c.
 John Birt Davies, J.P. & M.D.
 George Yates, Surgeon, W.R.V.C.
 S. T. Badger, M.R.C.S.
 Thomas Thompson, M.R.C.S.
 Charles James Bracey, M.B.
 Charles Yarwood, M.R.C.S.
 Wm. Hinds, M.D.
 John Day, M.R.C.S., Walsall
 C. H. Johnson, Shiffnal
 C. T. Male, West Bromwich
 C. Marriott, Leamington
 R. S. Busby, Leamington
 J. E. Male, Leamington
 G. Horniblow, Leamington
 A. Hastings, Leamington
 Thomas Ebbage, Leamington
 J. R. Nunn, M.R.C.S., Warwick
 Burrows Kirby, M.D., Warwick
 J. Bullock, Warwick
 W. Lynes, M.D., Wednesbury
 John Manly, West Bromwich
 Edward Tylecote, M.D., Great
 Haywood
 Edward Dickinson, Rugby
 Edward Allsopp, Rocester
 Perry Dicken, Ashby-de-la-
 Zouch

Wm. J. Perrin, Stafford	Alfred Freer, Stourbridge
D. P. Evans, Belper	John D. Scurrah, M.D., 114, Broad Street
J. S. Gaunt, Alvechurch	Henry Haines, Stourport
J. H. Lakin, M.B., Sutton Cold- field	R. W. Hunden, Albrighton
John Nason, M.B., Stratford- on-Avon	John Tibbits, Warwick
Hugh Morrow, Cradley Heath	C. S. Howard, Redditch
Henry Hodgson, Cradley Heath	G. E. Howitt, Wednesbury
Thomas Haslehurst, Claverley	J. Garner, General Dispensary
Wm. Hunter, Kilburne	J. T. Smith, Sutton Coldfield
William Spackman, Penn Fields	T. S. Swinson, Leamington
Thomas W. Ransom, Darlas- ton	G. O. Drury, M.D.
Thomas Underhill, Gt. Bridge	W. C. Garman, M.R.C.S., Wed- nesbury
W. H. Cooke, M.D., Aldridge	W. Griffiths, M.R.C.S., Led- bury
J. M. Hallsworth, Atherstone	W. Thursfield, sen., Bridgnorth
George Mousley, Atherstone	S. C. Walker, Warwick
Henry Hancox, M.D., Wolver- hampton	J. C. Garman, Wednesbury
J. J. Bunch, Wolverhampton	C. E. Welchman, Lichfield
John Hitchman, Leamington	W. Wright, M.D., Shipston-on- Stour
Richard Meredith, M.R.C.S., Netherton	H. T. Lomax, Stafford
W. Thursfield, Bridgnorth	R. Hughes, Stafford
S. H. Evans, Derby	J. Beddard, M.B., Notts
S. E. Walker, Warwick	A. H. Godby, M.D., Newport
Henry Bidwell, M.D., Albrighton	V. Jackson, Wolverhampton
Walter Acton, M.R.C.S., New- castle, Staffordshire	R. A. Cotterell, M.D., West Bromwich

“20, Broad Street, Nov. 28, 1863.

“I have employed Salt's truss in some *very* difficult cases, and consider it a decided success. It fits beautifully, as all the parts are so easily and independently moveable and adaptable; it exerts firm pressure deli-

cately, with nicely regulated accuracy and in the right direction; the spring allowing the pad to be adjusted, so as to imitate most closely the action of the surgeon's finger on the ring. The pads are so ingeniously constructed and beautifully finished that they are undoubtedly softer, less irritating, and safer than any others I have used.

"J. SAMPSON GAMGEE,
"Surgeon, Queen's Hospital, Birmingham,
late First Class Staff Surgeon.

"Mr. T. P. Salt."

"8, Easy Row, Birmingham, Jan. 23, 1864.

"Dear Sir,

"I have, for a considerable time, worn your 'Patent Orthonemic Truss,' and am, therefore, prepared to say, that I find it is perfectly philosophic in its principles, and equally admirable in its mechanical construction, giving (with the utmost ease to the wearer) the usual inward pressure, and at the same time an upward or lifting force, equally essential to the support of hernia.

"Faithfully yours,

"WILLIAM HOWELL, L.R.C.P.

"Mr. T. P. Salt."

"Cannon Hill, King's Norton,
Birmingham, Jan. 13, 1864.

"Sir,

"I have now worn your patent truss four months; I can walk any distance with comfort; in fact it is a reality.

"Yours truly,

"JOSEPH SPIRE.

"Mr. T. P. Salt."

"Trent Foundry, Rugeley, Dec. 8, 1863.

"Dear Sir,

"I find the patent truss I bought from you perfectly comfortable and effective, and am much pleased therewith.

"I am, dear Sir,

"Yours very truly,

"JAMES MILLARD.

"Mr. T. P. Salt."

"Trent Foundry, Rugeley, Jan. 27, 1864.

"Sir,

"I continue to be much pleased with my patent truss, and shall have much pleasure in giving my testimony to its excellence.

"Yours truly,

"JAMES MILLARD.

"Mr. T. P. Salt."

"Birch Coppice, Brown Hills,
Walsall, Feb. 13, 1864.

"Dear Sir,

"I have great pleasure in bearing testimony to the value of your 'Patent Orthonemic Truss.' I have worn it about a month, and it is quite a luxury after wearing the old form of truss.

"I remain yours very respectfully,

"MATTHEW WEBB.

"Mr. T. P. Salt."

"Ratcliffe, Atherstone, Oct. 20, 1864.

"Sir,

"The patent truss I had from you answers my expectation—giving freedom to sit down and to ride on horseback—which was an impossibility with the old form of trusses.

"I am, Sir,

"Yours truly,

"SAMUEL BACON.

"Mr. T. P. Salt."

"2, France Street, Blackburn, March 20, 1864.

"Sir,

"I have seen my patient thrice since your truss was supplied to him; he states that he is perfectly satisfied with it, and considers it at once easy, good-fitting, and efficient.

"Yours truly,

"W. GARSTANG, M.D.

"Mr. T. P. Salt."

"Queen's Hospital, Birmingham, Feb. 20, 1865.

"Dear Sir,

"I have much pleasure in informing you that I have found your umbilical trusses to answer admirably—they appear, also, to possess the advantage of being easily applied, and cause no uneasiness to the patient.

"(Signed) THOMAS THOMPSON,

"(House Surgeon.)

"Mr. T. P. Salt."

THE END.

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